NCR
Computers and Terminals
NCR Limited
206 Marylebone Road, London NW1

COMPUTER WEEKLY

NOVEL METHODS OF DATA TRANSMISSION ARE BOUND TO CROP UP FROM TIME TO TIME. DON'T LET NEWLY HATCHED ICEAGE EGG YOU ON TO BIRD BRAINED SCHEMES!

If you want to talk to a Computer—tell it to ring
Ring 01-421 0628 or
Telex 923 914 (Robots G).
MODULAR TECHNOLOGY
P.O.Box 117, Watford, Herts. WD1 4FQ

ACS
MANUFACTURING SYSTEMS
Packaged or tailored
01-637 0105
061-236 0102

Number 563 Thursday, August 18, 1977 Price 18p

NEWBURY
The home of Low-Cost Visual Display Terminals
NEWBURY LABORATORIES LTD.
Industrial Estate, Bone Lane
Newbury, Berks.
Tel. Newbury (0636) 46698

ONE THAT GOT AWAY

Being a data processing manager needn't always be hell-on-earth, as Bob Mordey of Trident Television found while touring company properties to gather information for a computerised fixed asset system. At Windsor Safari Park, which Trident owns, he met a not-so-fixed asset, a dolphin called Flipper. Trident is running Sofe Computing's Sofe fixed asset system on its ICL 1901T to keep tabs on over 100,000 fixed assets.

ICL aims to double its turnover

A DOUBLING of turnover to £724 million by 1982 with 60% of business coming from overseas, is a main aim of ICL's plan for the next five years. And this performance would be achieved with only a 14% increase in staff to 35,700, giving ICL a turnover per employee of £20,300 and putting it in line with US competitors.

The plan shows that of the hardware orders in 1982, almost two-thirds by value will be for products which have not yet been announced. It indicates that those products could include a laser beam printer running at 20,000 lines per minute, holographic memory, disc systems with capacities of 20 times those of today's systems, and processors handling arithmetic at 50 times the current top rate.

"Even to maintain our present level of orders we must sell users the ability to process about 10 times as much work as at present," says the company.

ICL expects there to be a continued demand for medium-sized systems, and next year it plans to introduce the S1 and S2 and step up production of the 2960.

These medium-sized machines will help spread management control among individual sites. "This will create a need for computers with good management information systems at the centre and, in outlying locations, smaller computer systems or terminals and effective, fast communications."

The plan adds that "ICL must be prepared to provide suitable computers" to software houses which build systems around minicomputers.

On the software side, ICL says VME/B and VME/K will be the only two major operating systems for the next 10 years. "As most basic work on these systems has been largely completed, the next five years will chiefly involve making them portable and developing software for special purpose languages, the management of distributed processing and of databases, and programs for microprocessors, small systems and software driven components."

The success of the plan, says ICL, will depend partly on a reduction in the rate of inflation and increases in staff productivity. But it adds, "Success could make a dramatic impact on this country's balance of trade in computers, bringing the UK a surplus of £1,000 million by the end of the 1980s.

Challenger from NCR now in UK

THE new entry-level NCR 8200 series system, announced earlier this year in the US (CW, May 28), has now arrived in the UK.

Designated the I-8230, it is an interactive system competing with Burroughs' B80, IBM's System 34 and the ICL 220, but with "more advanced interactive multiprogramming capabilities," said NCR.

The basic system consists of a 48K-byte processor, expandable to 80K-bytes, five Megabytes on disc, tape cassette, VDU and 55 lpm matrix printer, and costs £21,450 for the hardware. Standard software packages for manufacturing, distribution and financial applications are available.

Maximum configuration offers 20 Megabytes on disc, three VDUs and line printers running at up to 200 lpm. Up to six tasks can be run concurrently.

The disc drives, with capacities of 4.8 or 9.6 Megabytes on fixed discs are new, as is the 200 lpm band printer. There are also new matrix printers with average speeds of 70 and 125 lpm.

NCR has also slashed the price for add-on memory for the I-8250; an extra 16K-bytes now costs £1,230 instead of £2,250 and an upgrade path via the I-8250 to the I-8430 is also provided.

● NCR is now prefixing the model numbers of its 8000 series machines with an I, an N or a V. "I" means that the system is primarily for interactive working, "N" implies that it works in "normal" or batch mode, and "V" means that it is a virtual system.

US holds up parts for Soviet contract

THE £43 million air traffic control system being built for the Soviet Union by Stansaab of Sweden is being held up by the need for components worth about £100,000.

The US Department of Commerce has so far not granted an export licence for the components, memory chips and other integrated circuits, which are the standard devices used in the Stansaab Censor computers.

If the licence is not granted, Stansaab can get similar components from Japanese manufacturers, but this would entail some redesign which would be costly in both time and money.

The USSR is anxious to get the system into service by 1980 because of the vast increase in air traffic which will be generated by the Moscow Olympics.

Stansaab is 50 per cent owned by the Swedish government, and there is anger over the Commerce Department's delay, because in 1974 Univac, one of the rivals for the Soviet contract, was granted a provisional export licence for the whole of its ARTS 3 traffic control system.

According to Gunnar Wedell, managing director of Stansaab, Univac came close to a broad co-operative agreement with Stansaab for the whole world, apart from the US and Japan.

"However, when the Soviet Union contract went out to tender, Univac was not prepared to make a joint bid with us and the plan to co-operate with them collapsed," he told Computer Weekly. "When we won the contract, Univac came back and asked if they could come in with us, but of course we were no longer interested."

Univac acknowledges that it offered help with the contract 18 months ago, and said it offered assistance again this year. Stansaab denies that it has had any approaches from Univac since the end of 1975.

The contract is to build terminal control centres in Moscow, Kiev and Mineralnyje Vody, and an area control centre in Moscow (CW, September 25, 1975).

IBM 3033 lottery results

DELIVERIES of the first of IBM's powerful 3033 processors have been scheduled and customers who ordered within the first two weeks of the announcement of the machines last March have been given the first six months in 1979 as the delivery period.

The delivery schedule is the result of a lottery which IBM held on orders placed in the first few days. IBM described it as "randomising the orders and sequencing them in a fair and equitable manner" (CW, June 23). This followed the weeding out of orders placed by organisations and individuals who hoped to sell their places in the queue (CW, June 2).

The UK leasing company Leasco, which ordered four 3033s, has been offered one for January and another for June, 1979. Another leasing firm, United Leasing, which says it ordered within an hour of the announcement of the 3033s, will get machines in March and June, 1979.

United Leasing chairman Barry Mitchell, says that "If someone puts in an order for with IBM now they won't get delivery for three or four years."

Dashboard computer

PERSONAL computing creeps a little bit closer this week with the news that Chrysler, in the US, is about to decide on a supplier for a dashboard mounted "trip computer" that is expected to be offered as an option on cars produced in 1979 or 1980.

Mostek, Intel and National have submitted single-chip microcomputers for evaluation with the car manufacturer, where the chosen device will probably be used to provide driver information such as speed, elapsed time, fuel consumption, etc.

Initial estimates indicate that an order for 100,000 devices will soon be forthcoming.

INTERNATIONAL BROKERAGE & LEASING
have opened offices in the UK
We offer short-term leases on all IBM equipment including 138s and 148s.
We are also Brokers in second user equipment.
We currently have available a 145 cpu with up to 768K (shown by benchmarks to out perform 138 at lower cost).
If you are changing any IBM equipment you should talk to us.
Write or call JOHN HENDERSON
IBL COMPUTERS LTD.
Unit 4B, Unitair Centre
Great South West Road
Feltham
Middx.
Tel: 01-890 7158
Telex: 933735

ATLANTIC
FOR SALE OR LEASE
3803 1/3420 5 x 4 Dual Density Tape System.
2821 2/1403N, 1/2051 8D2 Fast I/O System.
Available Immediately
Tel: 01-405 8238 Telex 268344
Atlantic Computer Leasing Ltd. 27 Chancery Lane London WC2A 1NF

FLIGHT International 5th Business & Light Aviation Show
CRANFIELD AIRFIELD
BEDS, ENGLAND
SEPTEMBER 1-3
10 a.m. to 6 p.m.
Europe's leading meeting devoted exclusively to business and general aviation, with an international exhibition of aircraft and services.
Entrance is free by registration ticket at the gate
Presented by Flight International . Dorset House, Stamford St . London SE1 9LU

Printed in Great Britain by Q.B. Limited, Sheepen Place, Colchester, CO3 3LJ, and published by: IPC Electrical-Electronic Press Ltd., Dorset House, Stamford Street, London, SE1 9LU.

NEWS IN BRIEF

OECD study by Logica

THE economic and social implications of international transmission of computerised information in Europe are to be studied by Logica under a contract from the Organisation for Economic Co-operation and Development.

The OECD is staging a seminar on the subject in Vienna from September 20-23. The Logica study will provide information on the use that is already being made of international data networks in Europe.

Amdahl profits

AMDAHL Corp reports that in 21 months of active marketing of its 470V/8 mainframe, aggregate pre-tax profit has matched the total start-up investments made in the first five years following the foundation of the company in 1970.

Privacy views

THE combined views of the BCS, the CSA and the DPMA on privacy will be issued soon in a statement being prepared at a meeting of those organisations this week. While differing on the details of privacy legislation, the three hope that an industry view on privacy matters will help the Data Protection Committee in drawing up proposals for legislation.

Warwick's one 168

THE IBM online bureau service based on a new centre in Warwick, (CW, November 25, 1976), is now expected to go live next spring with one 370/168, although the centre has the capability to hold six 168s. The network will have 80 high speed lines and will be monitored and controlled by an Medlus network management system from International Aeradio.

Briefing

Insac's man in US

THE man to lead the US operations of the NEB's Insac has been chosen. Insac does not intend to announce the name until its UK organisation has been finalised, but Cyrus Joffe, formerly with Univac in the US, is understood to be favourite for the post.

The US is Insac's first export target and the aim is to have an office in New York with a president in place "by early autumn", according to Joan Pearce, chief architect of the Insac venture (CW, July 14).

Employees share

THE scheme to sell shares in the company to ICL employees (CW, July 14), was approved at an extraordinary meeting of ICL shareholders on August 11. About 13,000 employees will be sent a letter at the end of the month giving details of the scheme. It involves a save-as-you-earn plan over a five-year period, at the end of which employees could own up to 2,502,657 shares — 1.75% of ICL's issued share capital.

Series 1 contract

THE first contract for Altergo's IBM Series 1 consultancy service has been signed with a big IBM user. No name has been disclosed but Altergo is known to have projects in hand for both manufacturing and service companies, requiring sizeable networks of Series 1s (CW, June 2).

New HP line soon

A NEW range of commercial systems is expected to be launched by Hewlett-Packard within the next few months.

DEC mainframes

THE future of the DECsystem line of 36-bit mainframes lies with the newer DECsystem-20 rather than the DECsystem-10, said a DEC spokesman. US sources suggest that the current 2050 processor will be complemented by a 2060 with cache memory.

Tote choice

FOLLOWING the cancellation of its contract with General Automation earlier this year (CW, March 31), and its decision still to go ahead with its £3 million plan for computer controlled betting systems (CW, July 28), the Tote has opted for Digital Equipment PDP-11/34 minicomputers.

NCR Datapac link

CLOSELY following the announcement of its Distributed Network Architecture, oriented towards packet-switching technology, NCR is to supply an interface processor complete with Standard Network Access Protocol software which will enable Canadian businesses to use the Datapac packet-switched network for linking to remote computers.

School system

ONE of the UK's leading schools, Manchester Grammer School, is installing a Systime series 3000 computer as a teaching aid for the 1,450 pupils.

Donald Michie

Two new views

Two leading figures in the international world of computing, Professor Donald Michie and Tom Gilb, are to write regularly in Computer Weekly. They will write in alternate weeks and will deal with a wide range of topics covering all aspects of computer research, development and use.

Gilb's subjects will deal with "computerware" and in his Gilb's Mythology column he will consider and explode some of the myths that sometimes confuse the computer scene.

Michie's column, under the heading Privateview, will explore the world of research, and take a personal look at the implications for society. He starts the series this week, page 6, with a look at the development of robot control for space research and compares the efforts at East and West.

Tom Gilb

US firm gets big PO order

BECAUSE it is so incensed at US equipment being ordered by the Post Office when British-built equipment is available, Case, the UK data communications specialist, is prepared to refuse a £500,000 contract, and is demanding an inquiry.

This is the second "Buy British" row that has blown up recently and comes only a week after the Employment Services Agency came under attack from Labour MP Eric Moonman for preferring US interdata minis to British alternatives from Digico (CW, August 11).

In this latest instance, the Post Office has placed a £500,000 order with Infotron, a small US company, based in Pennsauken, New Jersey, for multiplexers for the Dataplex service. Case was awarded a similar contract but is refusing to accept it because it claims that it could have filled the complete requirement and considers that, as a British company, it should have been awarded the whole £1 million deal. Case has already had two Dataplex contracts on a non-competitive basis.

"The specification for the tender this time was the same as on the last two occasions," joint managing director, Derek Lavel, told Computer Weekly.

The Post Office agrees that the Case multiplexers met the specification. "Once we have checked that the devices meet the required performance, we check price, delivery and additional functions offered," said a spokesman.

"The Infotron devices included additional features outside the specification that we believe our customers will need. These include automatic retransmission on error, buffer storage for short line breaks, and data compression."

Case points out that it could offer these features by modifying its present product, and believes it should have been

● Turn to page 19

ACM ban in aid of Russian scientist

AS a protest against the imprisonment of Russian computer scientist Anatoly Shcharansky, the executive of the American Association of Computer Machinery has decided to stop co-operation with or co-sponsorship of any events where Russian computer scientists play a significant role.

Shcharansky has not been heard from since his arrest five months ago on charges of being a CIA agent.

Some senior members of the ACM council, however, are to challenge this decision at the next council meeting on October on the grounds that more can be done for Shcharansky in particular, and Soviet scientists in general, by maintaining contact with the Soviet scientific world.

The Shcharansky issue simmered beneath the surface throughout IFIP, erupting on the penultimate day when ACM president Herb Grosch announced the non-co-operation decision at a meeting called to protest against Shcharansky's imprisonment.

Mrs Shehnransky is now living in Toronto, and as her husband has been particularly involved in computer chess, IFIP became a focus of the international campaign to release him.

A number of computer chess experts in Toronto for the world computer chess tournament, signed a letter of protest about Shcharansky's treatment.

The campaigners for Shcharansky claim that he is being persecuted as part of a general Soviet anti-Semitic campaign.

The Russians claim, however, that his contacts with other leading dissidents, such as academician Sakhnrov, and Western politicians like Senator "Scoop" Jackson, show that Shcharansky was involved in what they call anti-Soviet activities.

P to Q3 disc mate

THE chess challenge game between British International master David Levy and the Russian program Kaissa was abandoned on Sunday due to a disc interface fault.

The match was due to take place in Toronto after the Second World Chess Championship and was sponsored by an international consortium with Computer Weekly, Amdahl Corp, I. P. Sharp, and Control Data, all providing resources to try to get the game underway.

Levy has a £1,250 bet with a number of academics that he will not be beaten by a computer chess program before August, 1978, and has already beaten the new computer chess champion, Chess 4.6.

Kaissa, running on an IBM 370/168 had lost its world computer chess title (see Page 2) and it was thought that, against a human master, the more powerful Amdahl 470 V/6 might be needed. Amdahl therefore made available a V/6 at its Sunnyvale, California, site.

Last Friday, with Levy at Sharp's Toronto office, the first attempt was abandoned because of a fault in the transmission of the program.

On Sunday at 10 am, Levy, having won the toss, phoned through the first move from a hotel in Columbus, Ohio.

The move, P to Q3, was input by another international master, L. Day via a terminal at Sharp's Toronto HQ which had again

● Turn to page 40

Microdata bids for CMC Europe

AFTER less than two years under full European ownership the three companies that make up CMC Europe now look like returning to US ownership. Microdata, minicomputer manufacturer of Irvine, California, is bidding $11million for the group.

Microdata's president, Don Fuller, told Computer Weekly that he hopes the deal will be completed within two months.

The French, German and UK based firms that make up CMC Europe form what is described as a loose association. The Dutch registered holding company, Telsis, owns 75% of their combined stock, including 100% of CMC UK, while Industrial Leasing AB, of Sweden, holds 25%. The president of CMC Europe and founder of CMC UK, Ray Parry, is a major shareholder in Telsis.

The main CMC business is the manufacturing and marketing of key-to-disc systems, but the UK company has also been selling the Microdata Reality file inquiry system for two years.

In France Reality is built under licence and marketed by Intertechnique, and Fuller says this agreement will not be changed.

The deal will not affect the agreement between Sycor and the CMC companies under which the latter sell the Sycor 400 terminal cluster in Europe. (CW, February 17). Earlier this year Sycor was interested in acquiring a majority share in CMC but negotiations were not concluded, (CW, May 19).

COMPUTER WEEKLY'S INSIDE NEWS

Toronto tales

Last week over 3,800 people from 50 countries gathered in Toronto for IFIP 77, an international congress in which nearly 100 sessions were held in five days.

Malcolm Peltu and Stephen Bell were there to provide an on-the-spot report on the flash and bland behind the facts. And Chad was there to provide a few Down-time notes. Pages 2/4

Accounting for DP

Computers mean far more to accountants than merely acting as supercharged book-keeping machines. They can use computers in a wide range of important functions, including financial modelling, corporate planning, costing and a variety of specialised accounting applications. This week's supplement deals with some of these applications. Pages 13/19

Prize guy

For his lucid explanation of some of the problems of preserving privacy on computer databases, John Walford won third prize in the Computer Weekly/Infotech data security competition. His prize-winning essay is published this week. Page 18

ALSO.....

IFIP view 2/3
Downtime in Toronto 4
Letters to the Editor 4
Focus on accounting 6
Software File 6/7
Puzzler 7
Programmer Notes 8
Microprocessor News 10
People in the News 10
Op Spot 11
Three R's before computers 11
National CAL centre call 17
MPs criticise board 19
APPOINTMENTS PAGES 21-38

LEASING? BUYING? SELLING?
Contact the professionals - specialists in IBM equipment with over 8 years trading experience in Europe
Promodata
PROMODATA S.A.
43-47 Avenue de la Grande Armée,
75116 Paris, France
Tel. 501 5413 Telex: 63476
PROMODATA GMBH
Adlerstrasse 9,
4000 Düsseldorf,
West Germany
Tel. 38 69 88 Telex: 85 82 110
PROMODATA LIMITED
30-38 Hammersmith Broadway,
London W6 7AB, England
Tel. 748 0341 Telex: 933747
PROMODATA A.G.
Bahnhofstrasse 31,
8004 Zürich,
Switzerland
Tel. 23 94 23 Telex: 57 185

COMPUTER WEEKLY

Vol. 23 No. 563
Thursday, August 18, 1977

Editor: Malcolm Peltu
Deputy Editor: Tony Higgins
Assistant Editors: Keith Jones, Tim Palmer, John Kavanagh, Stephen Bell
Advertisement Manager: John A. Godley
Class Ad Manager: Mike White
Publishing Director: Eric Ickinger

IPC Electrical Electronic Press Ltd,
Dorset House, Stamford Street, London, SE1 9LU.
Telephone: 01-261 8000
Telegrams/Telex: 25137 BISPRS G
Overseas Cables: Comweek Bisnespres LDN SE1
Branch Offices:
Birmingham: 202 Lynton House, Walsall Road, Birmingham 22B. Telephone 021-356 4838
Manchester: Statham House, Talbot Road, Stretford, Manchester M32. Telephone 061-872 4211
New York: 205 East 42nd Street, New York NY 10017. Telephone: (212) 867-2080
Published weekly on Thursday. Registered at the Post Office as a newspaper. Price per copy 18p
© IPC Business Press Ltd, 1977

Do you qualify for your own free copy?

If you work with computers you may be entitled to join the 76,000 readers who receive Computer Weekly free-of-charge each week. Britain's leading computer publication is sent free to the following categories in the UK and Eire only:

- Company directors
- Company secretaries
- Management services executives
- Civil servants responsible for computing
- Management/computer consultants
- Lecturers and teachers
- Data processing managers
- Systems analysts/O&M officers
- Programmers
- Operators
- Computer salesmen
- Field engineers

To find out if you qualify for a free weekly copy, write for a readership application card to the Controlled Circulation Department of IPC Business Press (Sales & Distribution) Ltd, 40 Bowling Green Lane, London EC1R 0NE.

Subscriptions for readers outside the above categories are as follows: One year, UK and overseas £14.50. US and Canada $37.70. Students, UK and Overseas £7.30. US and Canada $18.90. Airmail rates on request.

Subscription requests should be sent to: IPC Business Press (Sales & Distribution) Ltd, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH. Tel: 0444 59188.

Circulation inquiries: Applications for readership, subscriptions and changes of address are dealt with at the addresses listed above. To ensure regular delivery of Computer Weekly readers who wish the paper to be sent to a new address should send full details including a wrapper label bearing the serial number to the appropriate department.

Back numbers can be had as available, for 40p post free.

UK Circulation: 76,068 with the highest fully requested circulation in the UK. International Edition (10 issues a year) Circulation 95,219 (UK 76,081, Int 19,138)

ISSN 0010-4787

IFIPVIEW

Decision on Russia a blow to concept of IFIP

THE ACM decision effectively to cease co-operation with Russian computer science activities (front page) was a major blow to the fundamental concept of IFIP — international co-operation.

And many who sympathised with the emotional intent of the action felt that the politicising of IFIP could lead to its ultimate destruction.

Dick Tanaka, whose presidency of IFIP ended with the ending of the congress, said at the opening ceremony, "There are those — even some who are close to IFIP — who fail to understand the sincere and continuing effort within IFIP to nurture and defend the concept of international co-operation as free of political influences as possible. And there are those who would turn IFIP into the same kind of political forum that so many other international organisations have become."

Although this remark did not explicitly relate to the protests that had been taking place in Toronto over the detention of Russian computer scientist Anatoly Shcharansky this issue must have been close to his thoughts.

In the end, IFIP tried to take a neutral role in the affair, going to the length of cutting off its name from headings on leaflets distributed about Shcharansky but not banning the leaflets and notices about a protest meeting held in one of the rooms used by the conference.

The fear of those who oppose the decision of the ACM — taken by the executive committee in Toronto — is that, by its emphasis on international co-operation, IFIP gives an opportunity for computer scientists to meet and discuss technical and social issues in as free and open way as is practical today.

International co-operation is perhaps the only valid reason for having a massive congress like IFIP 77. The NCC in Dallas last June and the numerous other conferences throughout the world cover the same areas in a less elephantine way.

What makes the event unique is the gathering together of people from many countries, firstly to organise the complex programme and then to meet together to talk, listen, discuss.

While there is a lot to be said for holding to one's moral and political principles, there are so few genuine international forums today that IFIP, despite its faults, is something to cherish and nurture.

By the time of the next congress in Japan and Australia in 1980, IFIP should examine some of the areas of neglect highlighted last week (see front page) and should become more relevant to some of the issues facing the world as a whole, not just the computer community.

And efforts should be taken to strengthen its international base, particularly to Third World countries. In Toronto, the vast majority of speakers and delegates were from what could be called the developed nations of the Western world and East Europe.

Active efforts should be taken to include developing countries, perhaps including a specific theme on the role of computer technology in the Third World.

Dick Tanaka summarised the challenge facing IFIP in his opening speech. Having referred to a saying that technology changes faster than the rate at which politicians can make up their minds, he added: "I have some concerns as to whether IFIP is adapting itself rapidly enough. Is IFIP, too, falling into the trap of moving too slowly to keep up with the implications of our technology?

"Are we deciding more slowly than the rate at which problems arise?

"These are not rhetorical questions. I think IFIP is more concerned and more thoughtful than most individuals I know. And if IFIP is falling behind, what does that say for the rest of the profession?

"If we still believe that our technology has special attributes in its potential effects on society at large, we have to be instrumental in determining what these effects shall be.

"We can all do more than we have."

—Malcolm Peltu

QUOTE

"We should not assume politics and economics are the same. They are not. Politics defy understanding; economics defy analysis." — Dr Dick Tanaka, retiring IFIP president.

Dr Dick Tanaka . . . "We can all do more than we have."

Kaissa loses world chess title

FOLLOWING its surprise defeat in the first round of the Second World Computer Chess Championship in Toronto, the Russian program Kaissa lost its world title to the American Chess 4.6.

But early fears that a bug had been introduced to Kaissa during its transfer from an ICL System 4 to an IBM 370 version have now been dismissed.

Sixteen programs competed in the tournament, with the top British entry being the sixth-placed Master from the Atomic Energy Research Establishment.

The tournament is played in a Swiss-style league, which starts off with a seeded first round and pairings for subsequent rounds dependant on previous performance. Four games were played by each team.

In this set-up, Kaissa and Chess 4.6 never played each other in the tournament proper but a special exhibition game between the teams was arranged, with Chess 4.6, from Northwest University, emerging as winner, and, therefore, undisputed world chess champion.

Chess 4.6 ran on Control Data Cyber 176 processing 16 million instructions per second, and the Russian program Kaissa enjoyed good Western hardware in the shape of a 5 mips IBM 370/168.

Consternation was created by the strange case of the bug which was not a bug. Kaissa's defeat by Duchess from Duke University (CW, August 11) was signalled by an apparently suicidal free gift of a rook in the middle of its first round game.

It was unanimously concluded by the chess experts present that this moment of madness was the result of a previously undetected program bug.

Next day the Moscow programmers Mikhail Donskoy and Vladimir Arlazarov reported the results of a program trace. The bug was no bug, but an act of calculated desperation.

The assembled chess masters, including Grandmaster Botvinnik who had flown from Moscow to watch the play, had failed to see that the burnt offering of a rook was Kaissa's only way to dodge a deep laid and devious mate in five.

In the exhibition game between Kaissa and Chess 4.6, fireworks abounded. Wild and turbulent mid-game positions and unexpected shifts in the balance of fortunes eventually simplified down to a four-pawns-against-three ending, theoretically, a straightforward win for Chess 4.6.

Programmers David Slate and Larry Atkin sighed with relief as their program, now searching out to depths of 10 and 12 ply in the look-ahead tree, gave a wholly deceptive appearance of knowing what it was doing, and played out to victory like a master.

—Donald Michie

Impact of hobbyists

COMPUTER hobbyists are probably having a more profound effect on technological developments than the radio amateurs did in the early days of radio, according to Paul Baran of Cabledata Associates.

In his IFIP paper on the past, present and future of networks, Baran suggested that the hobbyists would provide most of the motivation and creative energy in building people-to-people communications networks that will make information technology a "pro-people" one.

These networks would be used for electronic message switching networks, games, social and work contacts.

Baran concluded that, "By undercutting the existing tariff structure for record traffic by by-passing government controls, we may be able to do more in create effective and international co-operation at the person-to-person level than all the grandiose institutions that have been tried in the past, including the United Nations, international broadcasting, the Soyuz-Apollo link-up and large scale diplomatic agencies taking turns entertaining one another at the expense of the taxpayer of the hosting nations."

A more human interface

WITH computing technology proceeding at undiminished pace, the gap between technological capability and computer people's appreciation of its effects on the rest of humanity has become painfully obvious.

It was appropriate, therefore, that this year's IFIP conference should concentrate on the consequences of ever more powerful computing to the human race at large.

The topic is truly vast, but the IFIP congress managed, in its frenetic five days of six parallel sessions, to cover a great many of the ramifications, from the traditional bugbears of security and privacy and rising unemployment, to the question of presenting a more "human" interface to non-computer people using the machine as a learning or design tool, or as a repository of information.

Some of the other aspects considered, such as computer networks and program proving, would seem at first sight to be of more "internal" and purely technical interest; but these too are bound to have their impact on the mass of users. The growth of communications between computers presents a wealth of potential benefits and threats, and with ever larger software systems helping to regulate essential services, it is of critical importance to the bulk of humanity that these systems should operate as reliably as possible.

Though the decision of IFIP to use the theme of the "maturing profession" to take a serious look at its wider effects is undoubtedly laudable, the presentations and discussions often made it depressingly clear how little progress has been made in the area so far. Some valuable initial work was revealed, but one presentation after another was followed by the raising of problems which had been marked down by the speakers only as "Topics for further research."

Another disturbing factor was the noticeable absence of representatives of the chief class under discussion — the non-computer people. When, during one presentation, a delegate remarked that such people "cannot afford to come to the conference," the expected laughter was followed by a perceptible pause. It was, for a moment, clear that this potential watershed of computer science's view of the outside world could go down in history as just another academic junket for the computer people.

There was, however, noticeably less of this academic aspect than at many other conferences, and there were comforting glimpses of the computer scientist who had already done some deep and broad thinking into the consequences of the advances of the past few years.

—Stephen Bell

Report from Toronto by Malcolm Peltu and Stephen Bell

'Micro has meant 25-year leap back'

THE microprocessor has meant a "great leap backwards of 25 years" in programming technology according to Professor Edsger Dijkstra, a structural programming pioneer.

In a remarkable speech that electrified the audience attending a session on the impact of microcomputers on computing, Professor Dijkstra made an all-round assault on the micro, suggesting not only that it has set back programming standards but that problems with testing chips could lead to chaos.

He said that the micros were an example of how money had become "the currency of thought."

"We used to say that computers were expensive because they were so great; now it is said that micros are so great because they are so cheap."

He said that he was "sickened and appalled" by some of the programming examples he had seen in the American hobbyist home-brew computer magazines because they contained all the programming bad practices that software engineering techniques had tried to eliminate.

Many delegates violently disagreed with his attack.

The UK's Iann Barron, who chaired the session, pointed out that verification techniques in micro-electronics had proved satisfactory to date, and that the micro, rather than leading to increased programming problems, could in fact make many programming tasks simpler.

He pointed out that he was using a calculator stop-watch at the conference that he had "programmed" in the sense that he had instructed the in-built program how to operate.

Isaac Auerbach, IFIP honorary member, said that, with micros, programming would cease to be an essential function.

Defending the programming profession to the last byte, however, Professor Dijkstra said that putting software functions into firmware would not solve the programming problems of logical complexity.

"If the micro opens up vast new uses, someone will have to create this large number of different programs," he said.

IN an impressive speech at the opening celebrations, the Canadian Minister for Science and Technology, Hugh Faulkner (above) said that society should no longer act in a passive way towards the impact of new technologies.

In the past, he said, there had been an unprepared reflex action in response to technological changes.

But he said that society must now look ahead to prepare itself to take an active role to control and exploit the impending information technology revolution that would create a new "information processing society."

He also called for international co-operation to ensure consistency in dealing with issues such as the flow of information across national borders (CW, August 11).

Different role for information

ONE of the best received papers came from Bob Tricker of the Oxford Centre for Management Studies, who looked at the impact of information systems on organisational thinking.

Tricker's main thesis is that the "information explosion" is not merely a matter of quantity. With efficient information systems, information takes on a qualitatively different role.

"Labour wants information about the company's achievements and intentions," said Tricker. "This is not required merely as a tool for wage bargaining; it results from a fundamental realisation that information is a valuable resource crucial to power. Power can be defined as the ability to make things happen."

The information-power relationship lay at the root of many of the stresses felt increasingly by modern management, and the noticeable shift in management roles, he said. The managers themselves, however, had not realised this phenomenon until comparatively recently.

Tricker then posed the question "Does the organisation structure depend on the information system, or vice versa?" He concluded that the relationship worked both ways; information and organisation were interdependent.

Availability of information affected the organisational structure and employees' roles. Equally, information needs were dependent on the role of the person requiring the information, and on the prevailing situation. Both were a factor of the organisational structure.

Tricker demonstrated this inter-relationship by outlining the information system structure of five companies, and inviting his audience to deduce the form of the companies' organisation.

Cutting violations of database by half

AN important concern of the non-DP user faced with a database is the problems of security and privacy. These were treated at some length by speakers at IFIP.

Norman Nielsen, of the Stanford Research Institute, California, addressed the entire topic of "system integrity," embracing security, audit and recovery problems. His approach was a statistical one, analysing prior detected violations of system integrity and deducing the frequency of particular types of violation, and hence the most effective safeguards.

It was concluded that over half the cases of violation could have been prevented by appropriate operational and procedural measures.

These areas were often neglected by present-day advisers on security. On the other hand, external security, which is given a good deal of attention, would have proved effective in a very small percentage of cases.

On a cost-effectiveness front, operational safeguards were also among the easiest and least expensive to implement.

A number of comments came from Nielsen's audience. One of the most telling critics disputed the validity of acting entirely on the evidence of detected violations. The proportion of undetected violations might be entirely different, he said.

Another interesting paper in the security area was given by Dorothy Denning, of Purdue University. Many databases now implemented allowed access to a statistical sample of data; but, in theory, not to data related to particular people.

The paper investigated the feasibility of making several queries on different subsets of the database, so that their overlaps would permit isolation of the facts on a single person.

Wilkes looks to future of systems 'off the peg'

STATIONERY shops selling low cost micro-based systems was one of the visions of the future sketched by Professor Maurice Wilkes of Cambridge University, in his look beyond today's computers.

Professor Wilkes, who was one of the pioneers of computers and programming methodology, also stressed that the role of the Post Office would be crucial to the future of computing because "the fusing of computers and telecommunications" would open up important choices for users in deciding between local and remote facilities.

While the very small business would be able to purchase micro business systems in high street stores, Professor Wilkes could not see the end to the central computer facility.

The building blocks for the new main system would be microcomputers incorporating compact, low cost and high capacity non-volatile memory, such as bubble memory.

These microcomputers would combine to perform similar functions to today's mainframes. But one crucial area of change, said Professor Wilkes, would be the elimination of the huge disparity of speed between high speed main memory and fixed head disc and drum storage which are currently used for operating system swapping functions.

Bubble memory could replace drum-type storage, which would also help to simplify operating systems.

buy, lease or rent:

- 303/ZIP ASR (30cps) printer terminal
- Teletype 33 and OD380 (10cps) printer terminals
- Teletype 43 KSR (30cps) printer terminal
- DECwriter LA 36 and DD 303 (30cps) printer terminals
- OKIDATA 110 (66 lpm) and Teletype 40 (300 lpm) high-speed printers
- Lear Siegler ADM 1A, 2 and 3A video keyboard displays
- Teletype 40 (72cps) video displays
- MFE cassette range

Data Dynamics

KNIGHT PROGRAMMING SUPPORT

THE ORIGINAL KNIGHT CONTRACT PROGRAMMING TEAM

Successful Software Support Specialists since 1970 in the UK and abroad

27 NOEL STREET, LONDON, W.1. 01-437 2184

RAIR TERMINALS

Purchase, Lease or Rent

HYTERM

45 c.p.s. keyboard text printer

- Microprocessor controlled
- Camera quality print
- Graphics Capability
- Variable character and line spacing
- Form feed, horizontal, vertical and "absolute" tabbing "Backward" printing capability

32 NEAL STREET LONDON WC2H 9PS TEL 01-836 4663

BRITISH EQUIPMENT

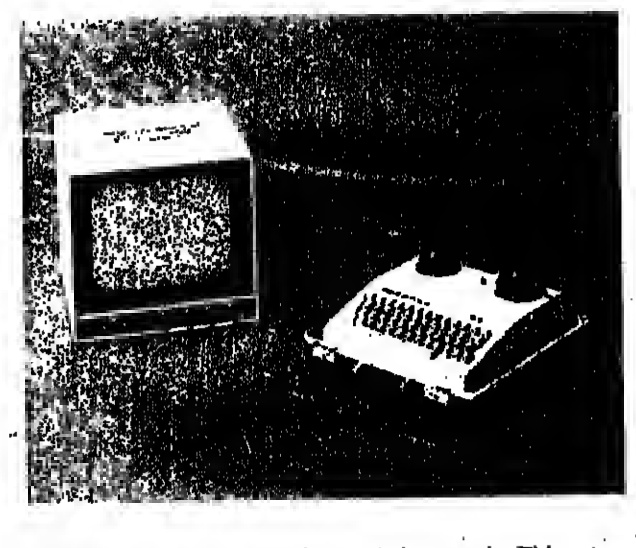
PAPER TAPE & 80 COLUMN CARD PUNCHES & VERIFIERS
PRINTING PUNCHES, CARD SORTERS
INTERPRETERS
Country-wide service organisation
Purchase, rental or leasing terms
16a Limes Road, Croydon
Telephone: 01-689 6537

SEN

ELECTRONICS PRESENT

"THE PORTABLE TWINS"

DIGILOG TELECOMPUTER II
'THE PORTABLE TERMINAL'



- Display via 5" monitor or domestic TV set
- Cassette Storage available as option
- Acoustic coupled 110/300 baud
- Display rates from 50 to 9600 baud.

With 40 or 80 characters/line weighing only 11lbs. and supplied with briefcase, *DIGILOG* means flexibility. Ideal for sales, demonstrations, field programming, training, remote data entry, etc. Over 200 *DIGILOGS* already installed in UK.

COMPUTER OPERATIONS
'SERIAL BOX'

- RS232 Interface
- 1 Mbyte direct access mass storage
- Full ASCII keyboard
- 40 character plasma display
- Microprocessor controller

Weighing only 23 lb., the *SERIAL BOX* is an interactive portable terminal, where ruggedness and ultra high reliability are essential. Uses include military applications, oil exploration, medial industries, etc.

SEN ELECTRONICS LTD.
5 LONDON STREET
CHERTSEY, SURREY KT16 8AP
TEL. CHERTSEY 68744
TELEX 947185

Please send information on: DIGILOG ☐ SERIAL BOX ☐
NAME
POSITION
COMPANY
ADDRESS

DOWNTIME by Chad

Terror of the Toronto bus

THE Canadian air traffic controllers' strike may have cut the attendance at IFIP down from the originally projected 4,000 or 5,000 to about 3,600. But those who did attend can now bore their friends with their own particular tale of the Toronto bussing terror.

Computer Weekly's team, for example, spent eight hours gatling to Datroit, during which British Airways showed tho Silver Streak ond one reel of "Fun and Games With Dick and Jane" ae the steward called the Jane Fonda-George Segal film.

A 4½-hour ride was then promised to get to Toronto. It turned out to be a seven-hour trip, including an hour-and-a-half stop at the border to have passports stamped, plus a three-times-round Toronto airport farce whila tha authorities decided whether or not luggage should be checkad by Custome.

Our American correspondent, Hesh Wienar, had a shorter bus ride from Niagara Falls. But one of the threc buses taking his plane-load of passengers broke down, so thay packed all passengers into two buses.

And at the airport, the bus was told to "act like s plane". So it drove down the runways, directed by airport ground staff. And the passengers even had to play the game of waiting at the normal luggage carousels, instead of getting their suitcases straight off tha coach.

The final word on air traffic controllers, howevar, came in the final words of the closing ceremonies of the conferenca, made by the new IFIP president, Professor Peul Bobillier.

Reminding everyone that IFIP in 1980 will be held for the first helf in Japan and the second half, four days later, in Australla, he said: "And let's hops there is no airline strika. Bussing arrangements between Japan and Australia might be difficult to arranga."

"Perhaps the only way of overcoming the high relative cost of software is to go back to child labour in the interests of miniaturisation." — Professor Maurice Wilkes of Cambridge Universtiy.

The optimism of the band of the Royal Regiment of Canada which performed at the opening ceremonias ranged from Everything is Coming Up Roses to I'm Looking Over a Four-leaf Clover.

Paul Godfrey, chairman of the council of the municipality of Metropolitan Toronto, could have done with a touch of the clovers. In welcoming the delegates he said, "I am sure you will appreciate the wonderful facilities in the town as . . ." at which cue the microphone broke down.

Once the sound was on again, he added with a smile, "I was going to say, as typified by this hall . . ."

And due to a miscue, bandleader Gino Falconi was left in limbo when he was about to start playing O Canada — which did not get played at all.

Passing over the 13th

THE well-known APL specialist bureau, I. P. Sharp, lives on the 14th floor of the York Centre in Toronto. As in many North American buildings, the 14th floor is the one abovo the 12th.

This particular exompic of the superstition la obviously the fault of the building's designere rather than Sharp, but a spokesman admitted that "Tha company does suffer badly from triskaidekaphobia".

It seems thut aome Sharp people alsn suffer badly from dictionary-swallowing but, aftcr all, APL and Greek do havo a lot in common.

One of the manifestations of Sharp's fear of 13s is the numbering of its APL update notices to users, which alao avoid the dread figure. This enabled one enterprising employee to insert a "spoof" notice, with tha referanca number 13, informing users of a function called "Quad-CL". This would advise a user that the output obtained from a program, while not that expected, was reasonably close.

● One of the characteristics of any convention like IFIP is the way so-called experts can fundamentally disagree on crucial issues. Compare, for example, the following statements:

"I am sickened and appalled by the standard of programming to be found in hobbyist magazines." — Professor Edsger Dijkstra, structured programming specialist.

"Hobbyist software tends to be better written than commercial programs." — Packet-switching expert Paul Baran.

In the world of the expert, perhaps the one-eyed naive user could be king!

'Use of computers in libraries should be stamped out'

IN the view of one US librarlan, promises made about the use of computers in librarles were fraudulent, large sums of money were spent for small return, and such machines should be stemped out.

This was one of many lively quotations given by Professor Gererd Salton, of Cornell Universlty, when he spoke at a joint meeting of the BCS Information Retrieval Group and Cambridge Univerelty Computing Department.

In his talk Professor Salton described the state of the art in libraries in America. He dealt with the attempts to introduce computers and outlined the present position.

The library could utilise computers in four possible ways: by plecemeal mechanisation, by implementing integratad library systems, by co-operative schemes between groups of libraries using network facilities, or by developing the library of the future.

The first of these was tried between 1955 and 1969 and was not very successful. The reasons for failure lay in the complex nature of library operations. They contained very larga files. At Cornell, for example, there were 4 x 10^6 items, each of which genereted an average of 15 cards. It wss a dynamic environment with a large number of additions, and these were rapidly increasing.

Tha diversity of operations was much higher than a data processing system with simple file processing and library staff ideally wanted a system operating in real time so that the location of any book could be determined instantaneously.

Philip W. Williams, chelrman of the British Computer Society Information Retrieval Group, reports on a joint meeting with Cambridge Universlty Computing Department, at which Professor Gerard Salton, of Cornell University, introduced some provocative views on the use of computers.

Professor Salton also gave a rapid glimpse of a future in which the problems of storing and transporting knowledge in heavy books could be eliminated. Texts could be created in electronic form; searching and retrieval could be by terminel access to text, graphs and tables through the telephone network; requested items could be made available either as microfiche or computer generated from stored text.

In discussing present and recent research effort, Professor Salton suggestad that we were now in a position to make eubstantial improvemants in information retrieval, although no commercial manufacturer had yet mounted a system using these modern ideas. A dealrable system would include these components: an automatic indexing system with an open-ended vocabulary which could adapt to a chenging environment; an automatic method for producing a tentative content analyels; a mathod of clustering documents by means of eome similarity maasure so that like objecte could be stored together and represented by a snmple member to reduce the number of documents scanned in a first comparison; interactive senrching with relevant feedback, so thnt the experience of searches could be used to modify the indexing and classification; o dynamic environment in which the feedback was allowed gradually to promote or retire documents so that re-classifiention dctermined by cumulative searching experience could take place.

The research by Professor Salton at Cornell nnd by Dr K. Sparck-Jones and others at Cambridge, has placed us in a position where these methods are available for implementation to create the next generation of retrieval systems. However, in a reply to a question, Professor Salton was rather gloomy on the prospects of these ideas being easily accapted in library schools, since he felt that the curriculum was totally wrong.

He believed that few professors in library schools knew enough to teach these new methods and even fewer students would understand them owing to their lack of mathematical vocabulary and understanding.

It is intended to follow this successful meeting with a forum presenting alternative store technologies for very large databases. This meeting will take place at City University on Wednesday, September 28, at 2 p.m. Details can be obtained from P. W. Williams. Computation Dept. UMIST P.O. Box 88, Sackville Street, Manchester.

Reorganising UK telecommunications industry: a poser for the working party

THE thorny problem of how to reorganise the UK telecommunications industry is being discussed by one of the government's 40 sactor working parties. These are tripartite talking shops set up under the auspices of the National Economic Development Office and include representatives of government departments, unions, and industry.

The working partiee were established to seek ways of regenerating British industry.

The core of the telecommunications problem is employment. Obsolete electromechanical telephone switching equipment is still being built for the Post Office simply because its manufactura la labour intensive, whereas the more modern electronic reed relay exchanges, and the upcoming System X have a comparatively low labour content.

There is, therefore, a need to reduce the capacity within the telephone exchange manufacturing industry, which principally involves three companies, GEC, Plessey nnd the ITT subsidiary STC.

Plessey has been hit hard by cutbacks in orders from the Post Office. GEC, on the other hand, has net cash assets of some £470 million, and has said in the past that it would welcome the formation of a single British telecommunications manufacturing company, by merging the interests of the three existing suppliers. It argued that such a company was necessary to enable the British industry to compete effectively with giants like GTE of the US in world markets.

A rash of speculation has surrounded Plessey in recent months, and severnl possible suitors have been named, among them Racal and STC itself. Any solution involving Rocal would probably includa a break-up of Plessey, because Racal is interested only in investing in success, and there would be little industrial sense in Racal taking over from Plessey as the third telephone equipment manufacturer.

GEC has not figured in recent speculation, and is not keen on getting involved in any more painful industry reconstructions at present.

The government would be unhappy to see Plessey fall into the honds of the American ITT, but some solution might be found where ITT eold a proportion of the STC equity to UK investors, as it hes done in Germany with its SEL subsidiary.

The most promising proposal being discussed at present is the formation of a new company, jointly owned by the Post Office, GEC, Plessey and STC, which would develop, manufacture end market the System X all-electronic telephone exchanges.

If a major reconstruction of the electronics industry is to take place, Decca as well as Plessey and Racal are likely to be involved. But despite all the speculation surrounding prominent companies like thase, GEC has indicated that it hae its eye on overseas investment. And Racal, as well as looking overseas, is currently investing in several small companies, among them Flight Refuelling, and the Brocks Group, which makes marine navigation aids, security systems and car radios.

The most significant outcome from any of the sector working parties so far has bean a decision to make grants to the ferrous foundry industry to alleviate a potential shortage of castings when the long-awaited industrial boom gets under way.

Industry sources indicate that the main value of the sector working parties will be the personal contacts which have been made with individuals in government depertments.

● Plessey has reported results for the yesr to March 31, 1977, in which turnover grew 16 per cent to £569 million, of which 51 per cent was done overseas. Exports from the UK ware up 36 per cent at £94 million, and net profit after extraordinary items was up 21 per cent at £12,437,000. The main extraordinary item waa a loss of £7,720,000 for the costs associated with closing telecommunicatione plants following the cutback in Post Office ordering. Pre-tax profit was up 14 per cent to £39.58 million.

—Tim Palmer

MDS holds takeover talks

MDS in the US is holding preliminary takeover discussions with Keuffel and Esscr, a precision engincering manufacturer with an annual turnover of about $90 million.

Keuffel and Esser is based at Morristown, New Jersey, near to the MDS headquarters at Parsippany. It builds reprographic, drawing office and surveying equipment. In the first half of this yenr, it made n $837,000 net profit on salcs of $45 million.

MDS turnover in its 1977 financial year ended April 30 was $146 million — 10% down on 1976. MDS attributes this to the planned withdrawal of some unprofitable product lines (CW, May 19). Its net profit in fiscal 1977 was aleo down, from $13.6 million in 1976 to $4.6 million. But MDS pointe out that the 1976 figure included extraordinary items of $11.5 million compared with only $1.9 million in 1977.

MDS bank debt at the end of fiscal 1977, at $33 million, was $25 million lower than in the year before.

FOCUS ... for accounting ... for change

RELATIONSHIPS between the DPM and eccountant are seldom harmonious. It has become traditional for the DP team to be at odds with their accounting colleagues, whether it is a question of budgets or workflow. The eccountant tends to assume that he alone has first priority on the machine — everything else can be ignored or rescheduled.

This stillude is often inherited from the far-off days when the computer existed purely to process accounts and invoices. Production control and warehouse operations were not part of the data flow. Many accountants still regret the rash moment when they yielded the control of the office accounting machine to a machine supervisor. Delegation at this stage must have seemed fairly innocuous — souped-up adding machines hardly constituted a threat either to the accountant or company.

But almost before the chief accountsnt could mutter "discounted cash flow," the small office system escalated into a fully blown DP centre. Reguing authority at this stage was not on. The accountant became isolated, unable to comprehend the existing configuration, let alone formulate future plsns. His role in computing operations becsme that of company liaisch officer. He was out of his depth in any operation more advsnced than punch-card input or tabulator output. A file sort suggested a hunt around the desk for the holiday list. If the system had sn audit trail, then the average accountsnt seldom got closer than first base.

While computer aystems could well be happily communicating with one anothar, the DP and accounting professions were on different wavelengths. The accountant no doubt regarded the DPM as the lateat thing in irresponsibility, whose notion of balancing budgets involved keeping fingers crossed or hoping for the best. Meanwhile, the DPM regarded the accountant ss a dedicated bookkeeper, out of his depth at anything more advanced than a desk calculator.

As a race, accountants tend to trail unless tackling such matters as inflation cost accounting or hedging future riska. They are very much in the standby league where computing is concerned. Given the choice, they would prefer to stand by company management, acting as interface between company and computers. This interface, however, is in the remote mode.

But it could well be that the days of the accountant are returning. The DP power swingometer is pointing back towards the accountant. The DPM's resources and responsibilities are on the decline, being eroded by the passage of technological progress and development.

His equipment is being distributed away from the installation. Workloads are being re-allotted to the user department. Mini and microprocessors are reshaping traditional computing activities. And there, poised to co-ordinate the activities, is the accountnot. His time could well have come. This is one revolution which the DPM has little chnnce of winning — at least in his present capacity.

Moving sideways intn management services offers n blenk solution. O & M grabs the intellect even less warmly than time and motion studies. Unless the DP mnnager is wary, he could well find himself being dispersed along with his section. The end of the dnta linc could be a project manager responsible for the smooth functioning of a "Data General Nova 3."

A survival lifeline, however, is on the horizon — even if the horizon is some way away in the United States. Evolution for the DPM thera is turning from data processing to that of a manager responsible for company information. This role haa considerable acope and possibilities. Information, whether markating data, business intelligence or forecasting, is whare the future of all organisations rests.

While tha accountant is busy figuring it all out, and making provision for last year's bad debts, the information manager will be manipulating next year's operations. Setting the company pace is a job suited to all DPMs.

Ten years ago...

COMPUTER WEEKLY — AUGUST 17, 1967

"THE possibility of communication with a computer from a remote point, only truly realised with the advent of a third generation, is gradually changing the pattern of costs of a computer system," said the president of CDC . . . A Shrewsbury headmaster devised a vocabulary-compilation technique for school foreign language textbooks, which was said to make teaching and learning easier by enabling a list of all the words in a text to be made . . . A standing committee to advise on government computer installations with particular reference to statistical applications was announced in the Commons . . . A databank referencing information in all American national libraries was planned in the US. . . . No UK students were among the 24 from 18 countries taking part in a six-month IFIP-organised seminar on administrative DP. Several students had the support of their governments.

LETTERS

Public service notion

LET me say how alarmed and disappointed I am by the largely self-interested approach of the articles concerning posts and telecommunications that have appeared in Computer Weekly.

To judge by these reports the advent of compnters is the most important event to hit the Post Office. But to whom is it so important?

Obviously to Iann Barron, Chris Evans, ICL and IBM — It is their livelihood. But let us not confuse the interests of the computer industry and its gurus with the intereats of the average parson in the UK.

While the telecommunications side of the Post Office has been making ever-increasing profits by placing massive investment into high technology, the postal service has been rapidly deteriorating. It may well be that "computers are going to affect-all our lives," but not necessarily for our own good.

The telephone la by comparison an ancient invention yet still we have not reached the era of a "phone in every home". I do not think we need to fear a "terminal in evary home era" in the lifetime of this planet.

The most important problem as I see it is ona that receives little spoce in your columns. How much power has the man in the street to safeguard the meagre postal servica that remains to him (and which he understands) against the advance of big business and computer technology which press for ever more investment in high speed telecommunications?

To split the postal service from telecommunications, I fear, will be the death knell of the post as we know it and as many depend solely upon it.

It is time we got back to the notion that the Post Office is a public service and not the Mercury of the largest and most powerful users.

DAVE HARAN
Department of Social Research,
Universlty Hospital of South Manchester.

How to get positive response from 'ops'

WHY all this fuss about operators' responsiveness to the computing environment? Is it BCS-orientated where some "egg-head" is about to startle the Industry regarding the importance of successful computer operations? It may even be that thie concept has finally sunk in after 15 years.

After 12 years in this field, and having progressed through to almost every type of operation, I can say with profound conviction that it will take a very long time to change the present situation.

This is primarily due to the basic fact that there exists a dividing line between systems/programming and operations.

The chief culprit in this situation is the data processing manager. He may well hava to bolstar confidence and ago in his "prized" departments, but in this process adopts the "they are your minions" principle. Can this approach be correct?

Several yeara ago I laboured the point in these columns about the "team work concept" in computer departments only to obtain several snids, sarcastic egg-headed comments.

The rude awakaning has now dawned that with the more sophisticated systems, these agg-heada hava regrettably discovered that the oparations department haa become even more important now.

Surely, the user is the one who is going to deriva the greatest satisfaction from obtaining his output on time, accurataly computed. This calls for a high degree of anthusiasm in the relevant departments.

The stark reality is that these departmants have been sadly neglected, badly motivated and totally ill-prepared for their rola in customer liaison.

This simply doea not just happen. If operations personnal are suitably trained and motivated, they will respond positively to the needs of tha environment.

Broken interview promisas are one of the contributory factors. Poor documentation for data prep nnd program fault diagnosis is another weak area. Proper training facilities are important. Shift working conditions are very important. Maybe some of these egg-heads who have never worked after 5pm probably don't know what the term "shift working conditions" means.

At one large US-owned company, the computing area was deemed to be massive. Nearly 30 staff worked on each shift, this comprised 15 ahifta in the week ond invariably six at weekends. Thera was one coffee machine (not free) which was generally out of action after 5 pm. The company was beset with low staff morale ond absenteeism. Yes, it was indeed very difficult to understand why they were beset by such problems. One would hava thought that the Americans had nevar heard about psychology and motivation.

Basic commonsense would be all that is needed to achieve a more positive reaponse from operations staff, plus the will to want to do something positive.

Incvitably one will only get what one is prepared to put into a department — this is the crux of my contention.

Thus, because of this apathetic attitude, the accounting and personnel departments should wnnt to start "asking questions." Such matters as high staff turnover, expensive re-runs — both machine time nnd stationery — and user inconvenience should prove to be very interesting talking points.

Statistically, all operations departments cannot be as glum (or cun they?), us there must be some mnnngements endowed with some commonsense.

This is the only recipe for a successful department and where throughput could be at its maximum efficiency.

Surely it is about time the BCS realised that there just could be a professional status to computer operations and recognise this within its (full) membership status. Maybe it is waiting for a White Popar on the matter?

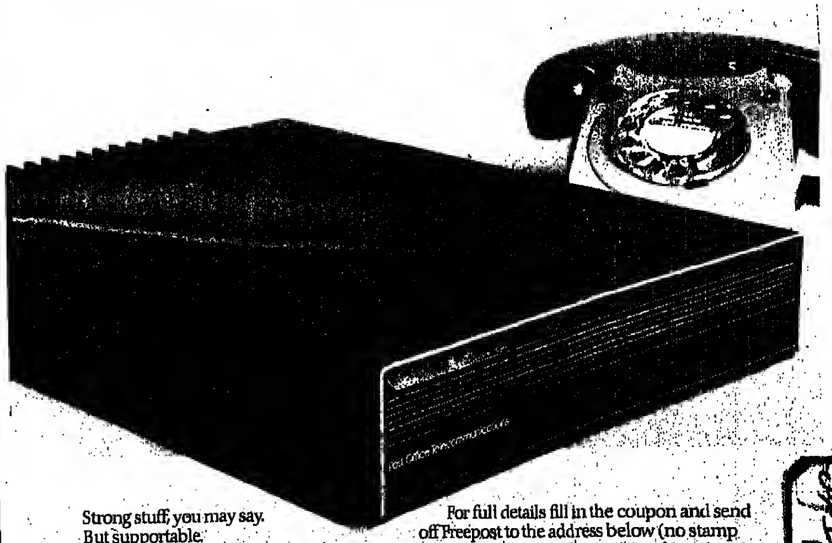
A. N. BALGOBIN
Rushall,
West Midlands.

STOP WASTING MONEY!
INPUT CHECKS PRODUCE — QUALITY DATA
MicroSim 8080
The world's most advanced Program development system
ALLEN COMPUTER SERVICES LTD

ACOUSTIC COUPLERS
Contact
MOORE REED & CO. LTD.
Walworth, Andover, Hants.
Tel: Andover 4156

The alternative to IBM.
Disk drives, tape units, memories, terminals, printers, System III.
Telex Computer Products UK Ltd.,
213, Oxford St, London W1. 01-734 9181
TELEX

The New Datel 2412
We can justifiably claim that it's twice as good as any other data transmission system.



Strong stuff, you may say.
But supportable.
Because only Datel 2412 offers a 2400 bit/s service on both private circuits *and* the inland public switched telephone network.
Something no other system may offer.
And that's not its only advantage.
It has test facilities to help you with your own service routines and fault location.
It conforms to C.C.I.T.T. recommendations V25, V26, V26 bis and V28.
The modem takes up only 0.37 cubic feet of your valuable space.
And last, but by no means least, maintenance support (which can operate around the clock) is on call from 61 Telephone Areas across the country. This is built into the rental – a thing you don't get from all other suppliers.
For full details fill in the coupon and send off Freepost to the address below (no stamp required). If you are also interested in operating at 2400 bit/s to overseas countries, please tick box below.
To: Alan Miller, Post Office Telecommunications, Product Management – Datel Services (TMK 4.2.1.), Freepost, London EC2B 2TX.
NAME
COMPANY
POSITION IN COMPANY
ADDRESS
POSTCODE TELEX NO.
Overseas operation ☐ Over
Post Office Telecommunications We're here to help you

MICHIE'S PRIVATEVIEW

Russian robots and other Eastern progress

Last week's IFIP congress re-emphasised the gathering revolution in information technology that is likely to create considerable shake-up in intellectual, social and economic life throughout the world.

Starting this week, Professor Donald Michie, head of the Machine Intelligence Department at Edinburgh University, will be providing a fortnightly Private view on research advances that will influence the course of this revolution.

Donald Michie was one of the Bletchley Park team which worked on Colossus, the codebreaking machine that is now regarded as the world's first electronic computer (CW, July 28).

In 1960 at Edinburgh University Michie began studies of machine learning and heuristic search. In 1999 he set up the experimental programming unit which developed the POP-2 language, and he played a leading role in developing Edinburgh's computer-controlled robot FREDDY. He became the world's first professor of machine intelligence in 1976.

THE Western world usually assumes that it is light years ahead of Eastern Europe in all aspects of computer development.

While this may be true in the hardware field in particular, at a recent conference on machine intelligence at Repino, near Leningrad, a number of Soviet contributions were of a quality which left many Westerners, to misquote James Bond, stirred if not shaken.

The conference, which I co-chaired with Academician G. S. Pospelev, was the Ninth International Machine Intelligence Workshop, and it amply proved that it is no longer only in the Western world that we see laboratories "striving to develop computers with as much intelligence as human beings" to use the colourful phrase used by The Times to describe research into machine intelligence.

Let us first take robotics, a field in which the US President, Jimmy Carter, has recently raised the stakes with a $6million hand-out to Pasadena's Jet Propulsion Laboratory. Their Mars Rover intelligent exploratory vehicle is to be operational by the mid-1980s. Why intelligent? Might it not be enough for it to be just plain clever, or even dumb but dogged?

Well, you would then have to radio-control it from Earth, telling it at each step what to do next. But since radio signals take half an hour or so to travel the distance, this is not practicable.

Radio signals, yes, but only to convey strategic commands. "Go behind the large triangular rock and collect a soil sample."

Tactical ways and means are for the on-board computing system to work out. Hence the need for it to be reasonably "intelligent".

Any other motoring problems on Mars? The terrain certainly looks stony, with crevasses and boulders here and there. JPL have put their trust in wheels, and I wish them the best of luck. But at Repino we were reminded that legs are not such a bad idea after all.

The latest film from Moscow had Professors Okhotsimski, Platonov, Gurfinkel and others putting six-legged robots through their paces. Around the rugged rocks the Russian robots run!

Of course JPL keeps its eye on this remarkable exercise, and so should the rest of us. Mars is not the only awkward terrain where Man may need to navigate.

Distinguished Russian work in robotics is not confined to Moscow. Valentin Ponomaryov's Leningrad laboratory has an interesting approach to database design for real time robots, as outlined to us by his co-worker Felix Kulakov who also has a book just published on underwater robotics. Intercommunication between modules is based on Dijkstra semaphores.

A paper by Andrei Ershov of Novosibirsk had the authority, precision and thoughtfulness that one would expect from the doyen of Soviet computer science.

Less widely known is the Dilos database-interrogation system which Victor Briabin, of Pospelov's Moscow group, has been quietly putting together. You talk to it in natural language. If this is Swahili or Urdu or other such with which Dilos happens not to be conversant, then you build up the new vocabulary, grammar and idiom as you go along.

Written in LISP, a version is running in Vienna at the International Institute for Advanced Systems Analysis. Readers whose holiday plans take them in that direction could do worse than drop by.

Briabin's system combines real-world applicability with full mathematical rigour and cleanliness of design. So while the final product is complex, subtle and useful, it remains possible to understand its structure.

Computer bums, hackers, non-documenting whizz-kids, self-taught genii of the small hours, and all who write incredibly clever and incredibly unstructured programs, please take note!

Donald Michie

Disc-space control package for Honeywell Level 66

LATEST package in the disc-space control market has been developed by Trident Computer Services, of Camberley, Surrey and Birmingham. While most such packages approach the IBM mainframes market, Trident's Filcon is aimed at Honeywell Level 66 machines.

A minimum size is initially specified for sequential files under Honeywell's Gcos operating system. Increase in the amount of data above this limit pushes the limit up; but with subsequent decrease, the limit does not move back again.

Filcon reduces the size of the file to that of the actual data content, freeing the empty space. This also handles the case where the initial minimum size specified was too large.

SOFTWARE FILE

EDITED BY STEPHEN BELL

Fortran on OLS bureau enhanced

AN enhanced version of Digital Equipment's Fortran is now available in the UK on the DECsystem-10s run by OLS Computer Services. The OLS enhancements include advanced string and array handling and new printout formats for business applications.

OLS said that its array handling facility will enable the user to specify an array size at run time, thus saving memory by using no more than is needed.

A character string can be written in to a variable. And the report formatting facilities make it easy to print to book keeping conventions such as brackets around negative amounts of money.

OLS has also developed interfaces between Fortran-10 and its applications products including its information management system Oliver.

An OLS spokesman said that although Fortran-10 was introduced several months ago it was company policy to wait until all bugs were cleared before implementing a new language.

1974 ANSI Cobol for Univac 1100s

A COBOL compiler which is claimed to conform to all the ANSI 1974 standards has been developed by Univac for its 1100 series of mainframes. The compiler is being tested at customer sites in the UK and is expected to be released officially in October.

Univac said the most significant of the 189 changes to the compiler included improved and clarified random and sequential file handling methods; a multi-key indexed input and output facility, with normal index sequential file handling as a subset; expanded variable-length table handling; and extra merge, library copy and debugging facilities.

In addition to the ANSI standard Cobol enhancements, Univac has added an EBCDIC tape file handling system, multi-tasking facilities, extensions to the DMS 1100 language to make database access easier in accordance with Codasyl specifications and fully re-entrant compiling facilities which produce re-entrant object code which can share common library routines with PL/1 and Fortran programs.

First projects

THE specification and implementation of a stock recording and control system, a BOMP-type database, and a fixed assets system using Taskmaster are among the first projects handled by a consultancy set up at Selsdon, Surrey, by Bill Kidston, Louisa Hussey and Brian Addington. Trading as Dewcourt, they aim to provide consultancy services for a wide range of systems including 370s.

NAG library boost for Prime 300s

THREE major software products — the Numerical Algorithms Group library of numerical subroutines and compilers for Algol 60 and Coral 66 — have been announced by Prime Computer.

And the NAG library in particular is expected to be a strong selling point for the Prime 300 minicomputer.

There are about 300 NAG subroutines for use in teaching, pure sciences and research and development. The system, which is "exceedingly well documented" according to Prime, includes an example run of each routine, complete with input test data and results.

Prime is only the second company to arrange a licence with the NAG group at Oxford University, the other being ICL. The NAG group sells the library itself to users of other machines, although it is discussing more licence agreements with other manufacturers.

The library was originally developed by five UK universities, but last year the group became a non-profit making company supported largely by the Department of Education and Science's Computer Board (CW, May 20, 1976).

Prime is marketing the library worldwide and offering full support, including training and system updates. The package costs a single payment of £5,500 or an annual charge of £1,200. Substantial discounts are offered to educational institutions.

The Algol 60 compiler is licensed from Wootton Jeffries and Partners, which developed the system on the Prime computer it runs as a time sharing bureau machine. Prime said the product will be of special interest to users of old Elliott and ICL machines looking for upgrades.

At present a pre-release version with limited input and output is available. Full input and output facilities will be available very soon and future extensions will include double length variables, direct compilation to binary with optional generation of assembler code and a re-entrant compiler generating re-entrant code.

The compiler is available for a single payment of £3,500.

The Prime 300 is now on the Ministry of Defence's list of approved machines for Coral. The language is already in use at four Prime sites, including the Computer Aided Design Centre in Cambridge. Coral costs £3,500 and is fully supported by the company.

Prime's software offering could be further enhanced shortly by an APL system. The company said that APL was being considered initially for the Scandinavian market.

45% more efficient Necol

A 45% increase in speed is one of several improvements which have been made to Necol, the system for converting NCR Neat/3 programs to ANSI Cobol. The system was introduced by Computer Facilities Software of Cleckheaton, West Yorkshire, just two months ago (CW, June 9).

Most of the improvements reduce to a minimum the manual editing needed after conversion. The system now automatically removes the quotation marks enclosing numeric literals, and the company said that the editing of printer records and control blocks is now no more than a minor task.

The speed increase reduces the processing time for converting 1,000 lines to less than five minutes.

In the UK conversion is done on the NCR 8250 run by Computer Facilities Software's sister bureau company in Scunthorpe. The system is sold on a disc pack overseas. The company added that it has had a large number of inquiries from the US, Canada, Australia and several European countries.

60% increase in efficiency for RAF supplies system

SOFTWARE developed by the Post Office's National DP Service to help control supplies for the RAF has been rewritten in a way which enables it to accommodate another processor, and this increases real time performance by about 60%.

The original software was a modified version of the Monitor system which formed part of the London Airport Cargo EDP Scheme, Laces.

As used by the RAF, the software runs on two ICL System 4/72s, one processing real time transactions from 500 visual display terminals at RAF stations around the UK and in West Germany. The other handles batch work.

A request for goods can be entered at any VDU. The system first searches the local RAF station's records for the item required and, if it is not found, looks at the records for other stations. It is claimed to locate any item within five seconds.

With increasing requests, the present system is becoming overloaded, so the RAF decided to install a third 4/72 alongside the others at the Supply Control Centre in Hendon, and to request appropriate modification of the software. The new machine will share the real time in a dual processor configuration.

The new software, known as Dual Monitor, will retain the same mode of operation, data base management functions and user interface as the present Monitor. It is expected to be up and running within the next few months.

First phase of tanker fleet reports system

A COMPUTER system developed by Computer Management Group is being used by the Irano-British Ship Service Company, oil tanker operators, to prepare monthly financial reports on fleet operations.

The system is based on a Burroughs B80 mini and presents reports in a variety of currencies.

Irano-British says that this is only the first phase of computerisation, as the entire operation is due to move to Iran in 1978.

The Irano-British Ship Service Company is a joint venture between the BP Tanker Company and the National Iranian Tanker Company, formed last year to operate a fleet of 10 tankers.

Three Grope enhancements

THREE enhancements to the Grope spooling system — which help with job scheduling, improve throughput and reduce the need for operator intervention — have been announced by Brown's Operating System Services, which developed the package for IBM 370 users.

The new version organises partitions so that jobs needing the most processor activity are given lowest priority. In addition programs in a job stream can be run in parallel as well as sequentially. A new output feature eliminates the need for syspunch.

Grope runs on 370 systems under DOS/VS. The monthly rental is unchanged at £120.

Puzzler

TRY this one in your head — it's easier than it looks.

Ten complete turns of wire are wrapped helically around a cylinder (9cm long and 4cm in circumference), starting at one end and finishing at the other. How long is the wire? See page 39 for solution.

save with Westinghouse
use Quikjob
The last file maintenance and creation facility
call 01-951 1999

Revised committees, new address for Codasyl

A REVISION of standing committees and a change of address have been announced by Codasyl, the international body representing both users and industry.

There are now six committees: they are the Cobol committee; the data description language committee, responsible for the Schema language; the end user facilities committee, formed last year to look at interfaces with databases for staff with no computing experience (CW, February 5, 1976); the Fortran data manipulation language committee; the systems committee, responsible for research in advanced languages and techniques; and the recently formed common operating system control language committee, set up to develop a job control language which is independent of suppliers (CW, April 7).

The new address is Codasyl, PO Box 1808, Washington DC 20043.

Panvalet's prestige customer

A PRESTIGE customer, in the form of BOC's bureau subsidiary Datasolve, has been won by Pansophic for its program library management system Panvalet.

The package, which now has 3,500 users around the world, was chosen after a detailed evaluation of several other systems including Datasolve's own Program Maintenance System.

Panvalet has been implemented on Datasolve's IBM 370 mainframes at Oxford Circus in central London, because, said the company, most of its future development work will be done there.

Leyland APL order

AN expansion of the use of APL by Leyland Cars in Coventry has been confirmed by the award of a contract to I. P. Sharp Associates to supply APL time-sharing services. Leyland Cars said it could have an in-house service within two or three years.

The main use of the language will be in planning. Leyland Cars currently is using APL for looking at the effects of different budget strategies; for manpower planning, including the staffing of the programming department; for planning the number of cars likely to be needed in each market around the world: and for modelling work-in-progress in its engine plant.

IFIP orientated towards the implications of DP for humanity

THE orientation of the IFIP congress towards the implications of computing for humanity at large did not ignore that important sector of humanity: the programmers and software developers.

They have their own problems in interacting both with the machine and with the non-DP-orientated personnel who request development of programs.

A number of IFIP sessions brought out significant ideas for software development techniques which, though at present primarily an object for academic study and use on large software products, are expected to spread rapidly into DP installations in general.

The chief impetus behind this trend is the increasing cost of the labour-intensive task of software maintenance. With improved communication of initial program requirements and improved capabilities for testing or proving the correctness of programs, software maintenance effort and expenditure could diminish drastically.

The lines for a panel discussion on programming management on the first day of the congress were laid down by Michael Jackson. Although not present himself, he had given all speakers some ideas on which to base their remarks.

The state of the art in software development is not satisfactory, said Jackson. "There are already many fronts of attack in trying to improve the situation, but we are not even aware of the nature of the problem. Are some of our 'cures' only concealment of the symptoms?" he asked. "Is radical surgery necessary?"

Consultant Tom Gilb, who will be starting a regular column in Computer Weekly next week, was particularly dismissive of some current techniques.

"We worship techniques like structured programming, without having quantified its effect," he said. "A religion is all right for a stable environment, but software development is not such an environment."

Along with development of quantification methods for such desirable attributes as maintainability, flexibility and portability, one should keep clearly in mind which of the goals were most important in which portions of the system, said Gilb.

Much discussion was devoted to the specification of requirements. Barry Boehm, of TRW, recommended use of a requirements specification language, in which a rigid document could be developed and signed by the user.

W. Hetzel, of the Blue Cross medical insurance company, felt that such rigidity could be used by the developer as an excuse for a refusal to adapt.

Discussion of change raised a question treated in Programmer Notes (CW, July 21); is it better to alter a program or completely rewrite it? It was accepted that discarding of old programs could be more widely practised. "If programs are not thrown away," said Ian Sharp, of I.P. Sharp Associates, "the organisation becomes the slave of the system."

Sharp had his own set of "golden rules" for good development, other principles being short programs and full documentation. "There should be enough documentation to recreate the program without looking at the code."

A subsequent panel session on the attendant topic of software reliability, opened with an attack from the legendary Edsger Dijkstra on the entire concept and the engineering view of software which it implied. "Software is not like a hammer," he said, "It is more like a mathematical theorem; knowledge is required to use it."

If a program did not stand up under misuse, he added, the cause might be that its conditions of use had been inadequately defined. It would be meaningless to say that the program was not reliable.

This sparked off a discussion on the scientific and engineering ways of assessing a program's reliability; by mathematical proof and by exhaustive testing.

The solution, suggested Susan Gerhart, of IBM, would be to use both methods, one supplying the deficiencies in the other.

Together with the more specific technical sessions, these discussions gave a useful demonstration of the tools available to the software developer.

A continuing problem, it was agreed, is the difficulty in persuading the ordinary developer to use such techniques.

PROGRAMMER NOTES

Operators have best qualifications

THE qualifications needed by programmers are often brought up by Programmer Notes readers, but while these discussions are usually about the merits of university degrees, one reader this week says that a few years as a computer operator are probably the best qualifications of all.

Laura Coaker, from Bristol, an operator turned programmer, says the advantages of a trainee programmer with operating experience are that he can visualise the computer and the operations department; he is familiar with the operating system; he knows to a certain extent how best to use the computer; and he knows the common programming errors which cause operating problems.

But most important of all, she says, he has friends in the computer room. This is important because normally the relationship between operators and programmers is "tenuous to the extent of being hostile." And this is because of each side's ignorance of the nature of the other's job.

"Operators rarely get the chance to program, and programmers are uninterested in operating. When this situation is coupled with the physical isolation of the two groups of workers it is hardly surprising that the working environment is not always as pleasant as it might be."

One problem which prevents operators moving into programming is the different qualifications for the two jobs, says Coaker. Programmers need at least one A-level but operators can get jobs with a few O-levels.

"The A-level requirements could therefore be waived for the operator who is keen to enter programming," she says. "Obviously not all operators want to become programmers and the nature of the programming project might necessitate high academic qualifications, but perhaps if the demand for paper qualifications were relaxed where possible, more operators might feel encouraged to take on active interest in programming.

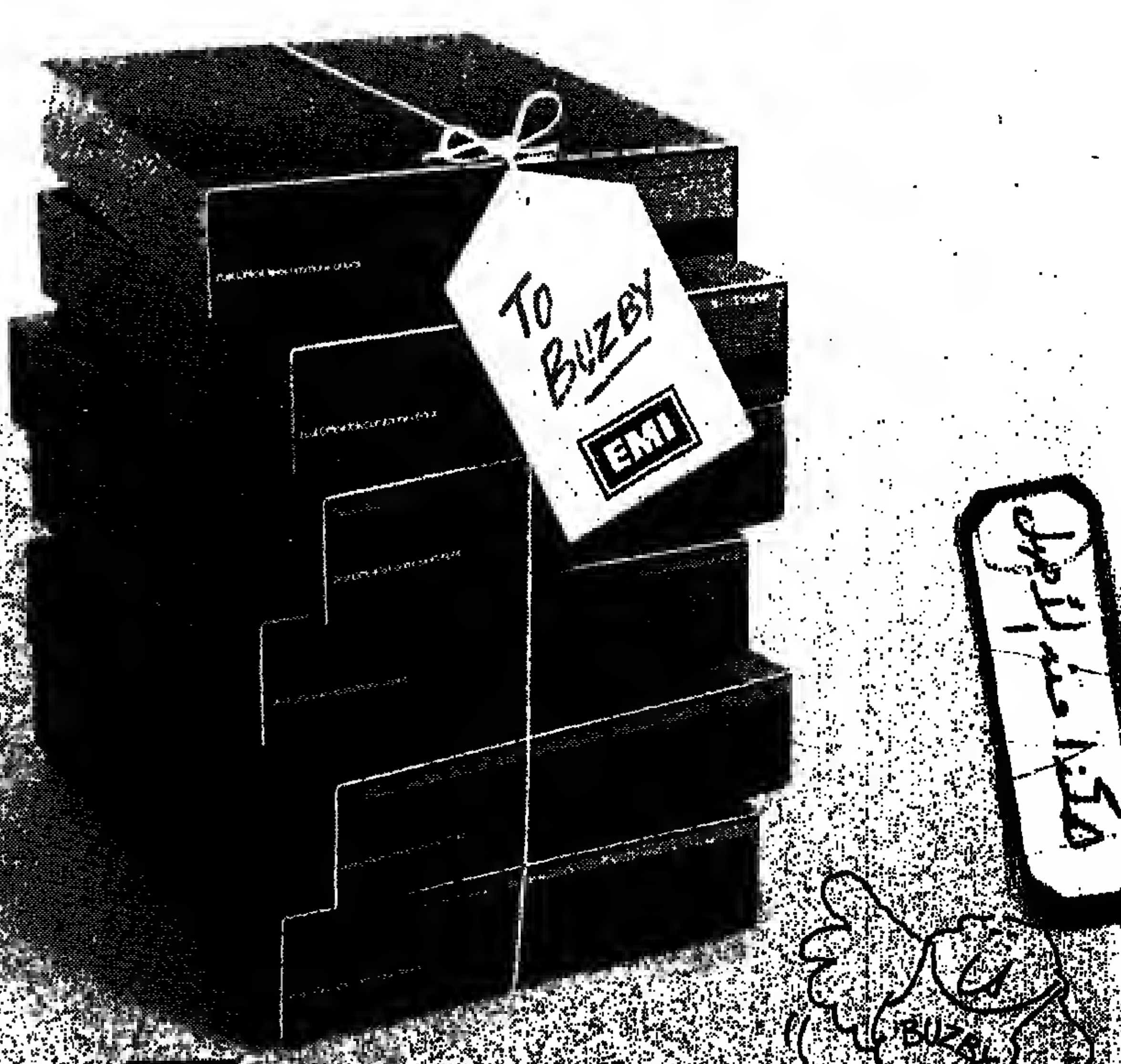
"If this became the case, fewer operators would be lost. And the better feeling between operators and programmers that this interaction produced, and the greater understanding of the computer which would develop, would surely benefit all computer staff and might even increase efficiency."

Coaker gives a word of warning, however, to operators considering a move to programming. Although she had sufficient qualifications for the move it was not an easy step to take.

How many other programmers have come from operating? What problems have you found? And when it comes to the promotion stakes, do graduates or people with better academic qualifications get preference? Programmer Notes would like to hear.

We deliver

EMI is more than pleased to have been awarded the contract for the supply of high performance modems for the Post Office Datel 2412 service.
These are being delivered from our Feltham factory at a rate of over 200 a month.
A good indication, you will agree, of the quality and reliability of EMI modems and of the development, manufacturing and technological resources behind them.
When it comes to modems, talk to EMI. We deliver.



EMI Technology

EMI modems range from 200 bps to 9600 bps; contact:
SE Labs (EMI) Limited, Spur Road, Feltham, Middlesex TW14 0TD. Tel: 01-890 1477. Telex: 23995.
A member of the EMI group. International leaders in music, electronics and leisure.

Microprocessor News

Forth launches high level programming for CDP/1802 minis

A HIGH level programming technique known as Forth is now available for use with the RCA Solid State CDP1802 microprocessor family.

Developed by Forth Inc of Manhattan Beach, California the language overcomes some of the objectiona levelled at high-level languages, especially that they are too clumsy and expensive for use with microprocessors, by making efficient use of system memory and time.

To use Forth, a programmer defines an application-oriented vocabulary of commonds which is mointained in n store, such as a floppy disc, in source form. The lsngunge is organised into a dictionary occupying almost oll the memory used by the program. Words con be added by "defining words," which describe the new word in terma of previoualy defined words.

One such word is "Code," which indicates that the word following is to be defined by machine instructions, and will cause specified machine instructions to be executed.

Forth has two interpreters. The first is high-level. It reads a word from the terminal, searches the dictionary for it, and executes the entry it finds. The second is a low-level interpreter, which executes a word defined in terms of other words. This offers advantages in terms of speed, independence of the machine, and the fact that it interprets compact definitions.

Unlike conventional high-level languages such as Fortran, Basic, and PLM, Forth is not ayntax-oriented. As many microprocessor users will not have prior programming experience, both Forth and RCA feel that this freedom from syntax will prove welcome.

Two levels of operation can be supported with Forth. It can be run with the RCA COSMAC development system, or as a cross-compiled version that has most of the support functions stripped away.

With the former, it is possible not only to program but also to test device drivers interactively in real time. Following this route, target systems can be developed in cross-compiled form after testing on a development system.

Motorola to release industrial control chip

DUE to be released next month are a 1-bit industrial control chip and two 4-bit organised bit slices from Motorola.

The controller, designated MC14500, has been specifically designed to meet the need for simple, sequentially-based industrial applications. Manufactured using the CMOS process to provide a lower power requirement, the chip utilises a single 5 volt power supply and operates on a clock frequency of 1MHz.

Up to 16 logic instructions and one conditional jump are provided, operating on a 4-bit instruction code. The chip can execute one instruction per clock period and, to save on program memory, uses a hardware flag for the conditional jump sequence.

The two bit slices are the MC2900 — produced as a second source to the Advanced Micro Devices AMD 2900 — and the MC10800, the first to be produced using Motorola's MECL bipolar process. The MC10800 has an instruction cycle time of 50 nanoseconds.

Both slices are intended primarily as development systems to be run on the Exorcisor development equipment. By using a modular approach to instructions, based on a 4-bit unit, variable-length instructions can be used to allow the emulation of other computer systems.

Teach-in for the bosses

FOR managers with little or no experience in electronics or microcomputing, Mektronic Consultants have launched a "Teach-in" aimed at clarifying the fundamentals of microprocessing.

By the end of the day, participants should be fully conversant with those aspecta of microprocessing which are most important and relevant to their own operations.

Further details of these £100 teach-ins can be obtained from Mektronic at Hinning House, 41 South Lane, Astley, Manchester, M29 7DE. Tel: Atherton (052-34) 68740.

EPROM programmer

AN EPROM programmer that can operate either as a stand-alone unit, or as part of the QMS Microcomputer System is available from Quarndon Electronics.

Designed as a single printed circuit board, the unit operates with either the 2708 1K x 8-bit EPROM or the 2K x 8-bit TMS2716 device.

Known as the QMSOO-1408, the programmer is equipped with a switching regulator to generate the necessary 26 volt programming voltaga from standard power supplies. It is also fitted with 2K bytes of RAM to act as a buffer store.

When used with the QMS microcomputer, the CPU's QBug monitor program can be used to move blocks of data into the RAM prior to programming and then subsequently verify that the EPROM has been correctly programmed.

Burr-Brown cuts its prices

PRICE cuts hava been made by Burr-Brown in their range of peripheral I/O devices for the microcomputer systems business.

The MP8408 8-channel, 8-bit analogue input board for the Intel SBC and MDS systems has been reduced from £544 to £506 while the MP11 2-channel output module for the Motorola 6800, the Fairchild F8 and other microprocessors, is now available for £92.10.

Reductions have also been made in the company's range of general purpose analogue-to-digital and digital-to-analogue converters, by amounts varying between eight and 30 per cent.

market place

For Advertising Rates PHONE 01-261 8757

NEW TELETYPE 33 ASR
UNDER £1,000 DUTY PAID plus delivery and VAT. Still the most popular, economical, reliable and versatile terminal. Delivery 4 weeks.
Also rental and after sales service.
Teleprinter Equipment Limited, 70-80 Akeman Street, Tring, Herts HP23 6AJ. 0442 82 4011 (7 lines), or Telex 82362.

PROFIT FROM YOUR COMPUTER WASTE
by contacting London's BEST BUYERS
DATAWASTE LTD
88 Wakeman Road, Kensal Green, London NW10 5DH
01-960 1000

tectonics guarantees
12 MONTHS FREE SUPPORT
on all development projects, from one-off programs to major systems
contact Terence Salmon ORP 29111
Tectonics Ltd 54 Tintagel Rd Orpington Kent
The fixed price fixed time specialists

WANTED
Secondhand electronic equipment of the following types:
D.E.C. PDP8MS, PDP8As, VK8Es and VK8As.
I.T.T. (S.T.C.) ADX6300 Systems
Please ring: 01-353 6060 Ext. 57 with full details of equipment with price, etc.

Contract Staff available
for Home and Overseas assignments
01 680 2400
Metra Lowndes-Ajax
119 High Street, Croydon CR0 1QJ
We are always interested in hearing from people who wish to work on a contract basis

NELSON COMPUTER SERVICES LTD.
BUY & SELL
COMPUTER SYSTEMS — ICL / IBM / DEC / BCL
DATA PREP EQUIPMENT — ICL / IBM / UNIVAC / KODE / TELETYPE
BURSTERS/DECOLLATORS/GUILLOTINES
D.P. STORAGE CABINETS (inc. FIRE PROOF)
FOR SALE
1 UNIVAC 1710 U1P £2,600
1 A Timms Decollator £225
1 3 Part Decollator (as new) £600
1 Mini Burster £250
1 WILKES Guillotine £475
2 KODE VIP 8U £2,500 each
FOR FURTHER INFORMATION CONTACT
St. John's Court, Rawtenstall, Lancs BB4 7PA. Tel. Rossendale (07062) 28128.

KIT OR BUILT
VDU MPU
CROFTON ~ 01-891 1923

COMPUTERS—PERIPHERALS ETC.
IN — OUT
WE BUY — WE SELL
HARD CASH — COMMISSIONS
Scopes, Test Gear, Anything considered
Phone: READING (0734) 586419
7/9 Arthur Road, Reading

FOR SALE
SCL Molecular 8m 8k core memory. Centronics 165 CPS 132 Line Printer, 076 Alpha Numeric Display. D.D.80Q Disc System.
SCL Susie 64 x 16 Drum. ISM 735 I.O. Typewriter. GNT Punch and Spooler. Foster Single Shot Reader.
Ring P. Glanville
041-336 4431

IMMEDIATE DELIVERY OF NEW
PDP II v 03
Floppy Disc Systems with software packages for
STOCK CONTROL PRODUCTION CONTROL LEDGER ANALYSIS
Also available
Low cost version of these packages supplied with Intel/Memorex floppy disc system at prices from £6,000 complete
data-J
Data-J Ltd., 7 Churchill Court, Rustington, Sussex
Tel: 09062-72902

WANTED
PDP 11/05 or 11/10
Telephone: 01-628 9413
RICHARD NORTON & CO
37 Salisbury House
London Wall, London EC2

NORTH WESTERN REGIONAL HEALTH AUTHORITY
SALE OF DESK-TOP COMPUTER
Tenders are invited for an OLIVETTI P.652 desk-top computer located at the Authority's HQ at Gateway House (adjoining Piccadilly Railway Station), Manchester — comprising magnetic card programmable — alpha numeric memory capacity — 4K Bit words — integral serial printer with 28 printing positions.
Further details and/or tender forms may be obtained from the Regional Administrator, North Western Regional Health Authority, Gateway House, Piccadilly South, Manchester M60 7LP.

FOR SALE
I.C.L. 72/1
Interpreting Punch
£600
Tel. 061-236 9751

CUT DEVELOPMENT COSTS
FIXED PRICE OR OFF THE SHELF
RSX-11
SYSTEM ENHANCEMENTS
Please write or phone:
SYADON LTD.
EVERSLEY (0734) 734493

TELEPRINTERS — 120 CPS
★ Available in KSR and ASR versions.
★ Switch selectable speeds up to 120 cps.
★ ASC11/APL keyboard.
★ Options include Vert/Hor Tab, FIFO Buffer etc.
★ Nationwide Sales and Maintenance.
Area Sales Tel
Midlands 021-459 5959
Scotland 041-221 9761
Wales Chepstow 2193
DATA DESIGN TECHNIQUES LTD.
5 Weldon Road, Wembley, Middx.
Tel. 01-903 6977

SECONDHAND EQUIPMENT
PHILIPS 352 c
BURROUGHS L3000
BURROUGHS L8000
MOLECULAR 18
Please write to Box 1881 Computer Weekly

FOR SALE
16 line DVI
DEC maintained
Available immediately
Ring N. P. CLARK
01-730 0286

ELECTRONIC BROKERS LTD
NEW 80 Column Hand Punch
Aluminium machine bed
Tool-steel punch block
Built-in chip tray
Send for Brochure
WE BUY WE SELL
SCOOP
up to 45% OFF HAZELTINE
Teletype-compatible CRT Terminals
HAZELTINE 1000 960 Characters. full/half Duplex. New list price £900 OUR PRICE £828
HAZELTINE 1200 1920 Characters. full/half Duplex New List Price £941. OUR PRICE £728
HAZELTINE 2000 1998 Characters. Editing. full/half Duplex and batch mode New List Price £1849. OUR PRICE £898
All units factory refurbished to as-new standard and covered by 90-day warranty. All prices subject to carriage and VAT.
ELECTRONIC BROKERS LTD. (Computer Sales & Services Division)
49-53 Pancras Road, London NW1 2QB Tel: 01-837 7781

FOR USED DP EQUIPMENT
BUY OR SELL THROUGH WDP 01-464 9011
NEW DE LUXE 80 COLUMN PUNCHES WITH SKIP OR NON-SKIP OPTION
A/N KEY TOPS, CHIP TRAY, WRECK KNIFE, DUST COVER. MAINTENANCE AVAILABLE FOLLOWING 1 YEAR GUARANTEE PERIOD
WDP 01-464 9011
WEBSTER D/P SERVICES LTD. 165 WIDMORE ROAD, BROMLEY KENT BR1 3AA

CoOperators A VLI COMPANY supply first-rate contract operations staff for long or short term needs -FAST
RING NOW 01.836 8411

IF YOU REQUIRE CONTRACT STAFF
OPERATORS
PROGRAMMERS
ANALYSTS
Phone 01-439 8481 NOW
(24-hour Answering Service)
PS. Don't forget our PERMANENT RECRUITMENT SECTION for all operators, programmers, analysts

CTB
For all computer time.
COMPUTER TIME BROKERS LTD.
A Computer World Trade Company

Contract Operators, Programmers, Key Punch Ops.
phone 4914706
Knight

KEY OPERATIONS ASSISTANCE LTD
CONTRACT
★ OPERATORS ★
★ PROGRAMMERS ★
★ PUNCH OPERATORS ★
LEADING SUPPLIERS OF CONTRACT OPERATIONS PERSONNEL THROUGHOUT EUROPE
SAVE TIME AND MONEY CALL US FIRST
01-493 6696
01-499 1787
4 HALF MOON STREET, LONDON W1Y 7RA
EUR/OPS

EFFECTIA GRAVIS
Personnel Consultants
01-439 8481
National House 60 Wardour Street LONDON W1V 3HP

YOU NEED THE BEST SO FORGET THE REST
Contact Sarah Smith on 01-283 3237 for
★ Top quality contract programming staff always available.
★ Rates from £150 to £220 per week.
★ References checked and work guaranteed.
★ Permanent staff also available
MARTON associates 208-210 Bishopsgate, EC2
FOR COMPUTER PEOPLE AT THE CROSSROADS

WANTED: OLD COMPUTERS
J. & M. COMPUTERS
47 High Road
Rayleigh, Essex
Rayleigh (0268) 742861
We have a variety of used computer and peripheral spares and we would like to purchase old ICL 1900 Systems. We will dismantle and collect from any site in the UK.

WANTED
Olivetti P603 Computer
EOB Equipment Ltd.
BCM Box 67B
London WC1V 6XX
Phone: 01-404 5011

OPERATORS KPG PROGRAMMERS KPG KEY PUNCH OPERATORS KPG
SUPPORT SERVICES YOU KNOW YOU CAN RELY UPON
KPG Ltd 28 THE BUTTS BRENTFORD MIDDX 01-568 7345

UK & EUROPEAN CONTRACT REGISTER
for all UK and overseas
Contract Personnel
OPERATORS · PROGRAMMERS · SYSTEMS ANALYSTS
WEST END HOUSE, 11 HILLS PLACE, LONDON W1R 1AG. 01-439 8891

FOCUS computer services limited
CONTRACT or PERMANENT —
ANALYSTS · PROGRAMMERS · OPERATORS
PUNCH OPERATORS · DATA CONTROLLERS
Tel: 01-487 5781 28A Devonshire Street · London W.1.

HEXAGON computer services
145 WARDOUR STREET LONDON W1V 3TB
Contract & Permanent Recruitment
Total DP Support
Programming
Data Preparation
Data Control

PEOPLE

WHAT, you're using US equipment? Education Secretary Shirley Williams shares a joke with three Honeywell Keyplex data entry system operators during a visit to the Department of Education and Science's personnel records centre at Darlington, Cleveland. The operators are Eileen Vart, Irene McGann and Gillian Moss.

Andrew Brown has joined Jenson Computer Systems as a systems analyst having previously been a customer software representative in Olivetti's systems department. Chris Mathews, a former PDP11/40 operator from Zimmer Orthopaedic, has joined Jenson as a trainee programmer.

Norman Campbell has been appointed DP manager with James Buchanan the whisky distillers, at Stepps, near Glasgow. Previously he was a project leader in the computer department of Strathclyde Regional Council.

Tom Bowler, formerly systems programming manager with Union Carbide, has joined Systems Resources as a senior designer. Graham Foxwell comes to the company as a senior analyst, which was also his position with Associated Engineering Group in Coventry, his previous employer.

David Dury and David Prier have been recruited by Charringtons Computer Services as marketing executives. Dury, a former Burroughs sales executive, will cover Essex and Suffolk while Prior, who has been selling accounting systems for Olivetti, will take on the Hertfordshire, Cambridgeshire and Bedfordshire area.

Jim Hewett, lately of ICL where he was a systems executive, has joined Rediffon Computers as a systems analyst based in Leighton Buzzard.

Michael Merse, senior programmer at System Aid, has been promoted to team leader, development division.

Tom Ryan, until recently field sales engineer with Cola Electronics in Ireland, has been promoted to area manager for Ireland, based in Dublin. John Power has joined Cole's Dublin office as a field service engineer from Burroughs in Ireland, where he was a service engineer for terminals and encoding equipment.

Cole's UK data products division has two newly-appointed sales engineers, John Saunders who was formerly field service co-ordinator, and Kevin Hayes, who joins from CRC Information Systems where he was a telecommunications engineer.

Phil Noden has become technical director of the manufacturing division of YB Computer Services. He joins the company from Control Data, having been manager of test and assembly at CDC's Brynmawr factory. Roger Billing, formerly YB's North-West regional manager, becomes OEM marketing manager while retaining responsibility for special accounts in the North-West.

Betty Howe, Honeywell's corporate guest services and travel manager, receives her award for 30 years' service from (left) Honeywell Information Systems president Clancy Spangle, formerly the UK company's managing director, with (right) present UK managing director Russ Henderson.

Marconi Fellowship candidates invited

PROPOSALS are invited for candidates for the 1978 Marconi International Fellowship, which commissions "significant creative works" in communications, science and technology.

The $25,000 fellowship, which was established in 1974 to commemorate Guglielmo Marconi's contributions to scientific discovery, is granted each year to an individual in recognition of outstanding contributions towards this goal. The recipient is invited to give a public lecture based on the commission. He may designate another person to undertake the work in connection with the fellowship if he wishes to do so.

Nominations must be received by October 15, 1977. Further information may be obtained from The Marconi International Fellowship Council, Aspen Institution for Humanistic Studies, 1919 Fourteenth Street, No. 811, Boulder, Colorado 80302, USA.

COURSES

ELECTRICAL engineers who wish to extend their knowledge in the communications field can take a part-time MSc course in communication systems offered by the Polytechnic of Central London. An era is approaching in which many classic communication systems functions will be radically remodelled, and one of the main objectives of the course will be to provide training in underlying theory felt to be of long-term relevance to development of complete systems. Classes occupy one full day a week for two academic years. Graduate level competence in electrical engineering is a necessary qualification for applicants. Further details from the Registry of Engineering and Science, The Polytechnic of Central London, 115 New Cavendish Street, London W1M 8JS, tel: 01-486 5811, ext 6235.

THOSE involved in assessing and implementing distributed processing systems may be helped by a course from Infotech, to be held in London on September 8-9, and entitled How to Choose a Distributed Processing System. Further details are available from Chris Boon, Infotech International, tel: 0628 32588.

THE programme of courses from SIA for September to December includes linear elastic frame analysis using the Leap 4 suite, next running in Edinburgh on September 21, offshore engineering computer services from SIA, October 4 in London, corporate modelling and financial planning with ICMS, September 30 and November 10 in London, and BIA computer-aided design service for highway projects in developing countries, November 3 in London. For the full programme and further details about the courses mentioned here, contact The Sales Manager, SIA Ltd, Ebury Gate, 23 Lower Belgrave Street, London SW1W 0NW, tel: 01-730 4544.

NCC SEMINARS

The National Computing Centre

'THE PROTECTION OF DATA BY CRYPTOGRAPHY'

Cumberland Hotel, London W1
Wednesday, September 28, 1977

This one-day seminar, run in association with the National Physical Laboratory, aims to introduce cryptographic methods, to consider capabilities for data protection and to examine implications of applying these methods. In particular the US Federal Data Encryption Standard (DES) algorithm will be introduced.

As new legislation approaches, this important and topical subject will be of wide interest to data processing and security personnel.

For further details contact:
Seminar Bookings:
THE NATIONAL COMPUTING CENTRE LIMITED
Oxford Road, Manchester M1 7ED, Tel. 061-228 6333

DIARY

AUGUST 21-26
Law of the world conference. World Peace through Law Centre. Manila, Philippines.

AUGUST 24
Meeting. UK and Ireland VM370 Users Group. Commercial Union. Details: Jeff Cribbin, 08832-333.
What kind of manager are you? OPMA. London W1. 18.00.
Talk on the computer industry in India. Dr P. P. Gupta. BCS Specialist Group for the Developing Countries. Zeus-Hermes, 2 Capper Street, London WC1. 18.00.

SEPTEMBER 6-9
Compcon 77 — micros, minis and maxis. IEEE (USA). Washington, DC.

SEPTEMBER 7
Developments in micropublishing seminar. Microfilm Association of Great Britain. Oxford. Details: Executive Secretary, MAGB, 8 High Street, Guildford GU2 5AJ.

SEPTEMBER 7-9
Symposium on data analysis and informatics. Institut de Recherche d'Informatique et d'Automatique. Rocquencourt, France.

SEPTEMBER 8-9
Meeting. IBM Computer Users' Association Programming Group. De Vere Hotel, Coventry.

SEPTEMBER 19-24
BAMA 77, Salon International de la Production Automatisée. SAMA International. Berne, Switzerland.

SEPTEMBER 26-28
Distributed computer control systems — international conference. IEE. Birmingham.

SEPTEMBER 27-30
Annual conference. Operational Research Society. The Queen's and Magdalen Colleges, University of Oxford.

SEPTEMBER 28
Computer access to large databases using alternative store technologies. Ken Groves, Peter Waterworth, Roy Brierley. BCS Information Retrieval Specialist Group. City University, London. 14.00. Tickets £1 from Pauline Wolters, at the BCS, tel: 01-637 0471.

OCTOBER 3-6
Computer application in medical care — symposium. IEEE Computer Society/Medical College of Virginia/George Washington University Medical Centre. Washington, DC.

OCTOBER 3-6
Euromicro 77 symposium. European Association for Microprocessing and Microprogramming. Amsterdam.

EARLY WARNING

SEPTEMBER 14-16
Society for Management Information Systems, annual conference. Dallas, USA. Details: SMIS, SUITE 2026, 221 North LaSalle Street, Chicago, Ill 60601, USA.

SEPTEMBER 15
Vandalism, sabotage, it couldn't happen to us — the security aspects of operations. BCS Operations Group. Polytechnic of Central London. 15.00.

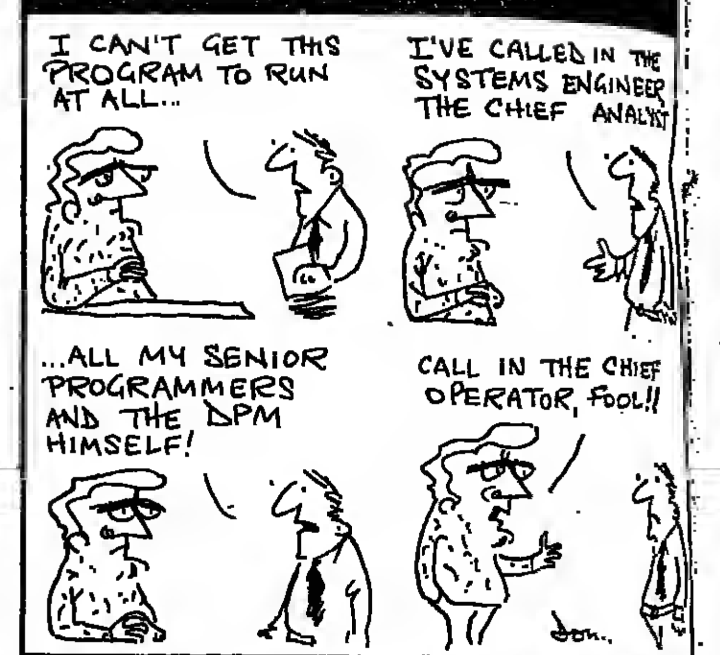
SEPTEMBER 19-22
Applications of numerical software conference. Institute of Mathematics and its Applications, Southend. University of Sussex, Brighton.

OCTOBER 3-7
Computer networks international symposium. John von Neumann Society for Computer Science/Hungarian Academy of Sciences. Budapest. Details: D. W. Davies, National Physical Laboratory, Teddington, Middx.

NOVEMBER 2-DECEMBER 11
Systemotechnika 77, third international specialised trade fair. Glavé International. Moscow.

NOVEMBER 8-11
Compsac 77, software and applications conference. IEEE Computer Society. Chicago, Illinois.

Liveware File by Don



Calls for papers

PAPERS are invited for the third Jerusalem conference on information technology, subtitled Computers, Communications and Technology Transfer. It has been organised by the Information Processing Association of Israel with the sponsorship of several information processing and computing associations including IFIP and the BCS.

The conference will place particular emphasis on technology transfer between countries, industries or social environments, and papers highlighting such transfer are specially required. The deadline for four copies of MSS is December 15, 1977.

Further information about the conference may be obtained from JCIT 3 Secretariat, IPA, P.O. Box 13009, Jerusalem, Israel.

A CALL for papers dealing with any aspect of DP audit, control and security has been issued by the Institute of Internal Auditors, Inc and the Automation Training Centre, Inc, joint sponsors of the eighth Conference on Computer Audit, Control and Security. "How-to papers, case histories, and accounts of personal experiences with advanced systems" will be of particular interest, although papers on any aspect of the above-mentioned topics may be submitted.

A one-page abstract together with a brief personal résumé should be sent, before November 1, to Harold Weiss, Program Chairman, Automation Training Centre Inc. 11250 Roger Bacon Drive no 17, Reston, Virginia 22090, USA, tel: 703-471 5751. Further information on the conference can be obtained from John J. Sheehan at the Institute of Internal Auditors Inc. tel: 305-830 7800, ext 227.

THE exhibition of the microfilm and micrographics processing industry, Microforum 78, will take place next year at the Wembley Conference Centre on June 13-16. It is organised by the Business Equipment Trade Association, the national body of the UK office equipment industry. Further details from BETA, 109 Kingsway, London WC2B 6PU, tel: 01-405 6233.

THE next word processing exhibition will be called the International Word Processing Exhibition and Conference 78 and will take place at the Wembley Conference Centre on June 6-8, 1978. It is organised by the Business Equipment Trade Association, the national body of the UK's office equipment industry, and will be twice the size of the previous event. For further information contact Hart, Browne and Curtis Ltd, 29 Sackville Street, London W1X 1OB, tel: 01-439 [illegible].

CONFERENCES

THE theme of Eurocomp 78 will be Information Dynamics, and the conference will set out to examine computer-based information systems with regard to recent developments in distributed processing, database organisation, computer networking and data protection legislation. The conference is organised by Online, with a steering committee which includes Carl Hammer, ICCC representative and Univac director of computer sciences at Washington, Andrei Ershov, professor of computer sciences at the USSR Academy of Sciences, and Christopher Layton, EEC science and technology director. It will be held in London on May 9-12, 1978. For further details contact Online, Cleveland Road, Uxbridge UB8 2DD, tel. Uxbridge 30202.

AMONG the conferences organised by the IEE this year are an international conference on distributed computer control systems at the University of Aston in Birmingham, September 26-28 and a conference entitled New Developments in Automatic Testing at the Metropole, Brighton on November 30-December 2. Further information from Annemarie Cunningham-Swendell, IEE Press and Public Relations Officer, tel: 01-240 1871, exts 272 and 280.

COMPUTER WEEKLY

The following special supplements are due to be published during

AUGUST/SEPTEMBER

DISTRIBUTED COMPUTING FEATURE
August 25th

Distributed computing — what does it mean? Is computer technology ready for it? What are the security problems? How are users going about implementing distributed systems?
Answers to these questions will form the basis of a Computer Weekly supplement on Distributed Computing on August 25th, when users, suppliers and consultants will put their cases for and against the growing industry trend.

INTERNATIONAL EDITION + BONUS CIRCULATION
SICOB PREVIEW
September 8th

In September, Paris awakens from its August holiday slumber to falling leaves and SICOB, one of the major European computer shows.

Computer Weekly, of course, has no summer rest and our International Issue on September 8th will be filled with its usual wide ranging coverage of the world computer scene, including a special preview of this year's SICOB. Where Computer Weekly will be exhibiting for the first time and additional copies of this special issue will be distributed from our stand. With an overall distribution of over 95,000 (U.K. 73,873, Overseas 21,248) this issue will provide an ideal opportunity for export minded companies to display their products, equipment and services to this unique audience of decision makers throughout Western Europe.

LONDON AND WESTERN
Stephen Measures 01-261 8293, Tony Kaminski 01-261 8022, Steven Meibh 01-261 8109, Lloyd Collins 01-261 8757.

MIDLAND
Ken Parrott 021-355 4838

NORTH AND SCOTLAND
Harry Aiken 061-872 4211

Stop Press: Computer Weekly continues to publish more product and recruitment advertising and has a higher fully requested A.B.C. (Audit Bureau Circulation) of 73,873, than any other U.K. computer publication. + Additional 21,248 regular readers in Western Europe via the INTERNATIONAL EDITION which is published the 2nd week in every month excluding August and December.

OP SPOT

OPERATIONS as a career? Or operations as a starting point to a career in the computer industry?

THE potential entrant to the computer industry, and in particular to the operations division, normally has little knowledge of the career prospects available to him. In many cases he is happy to accept the first position offered, as competition for trainee operating positions is high.

The training and career programme for operations staff is developing into three broad categories in the UK. The first category, and apparently the largest, is companies which recruit operators, usually with at least 12 months' experience, simply to operate their computer systems. They may be promoted eventually to shift leader level, but further promotion is unlikely.

These companies consider recruitment of staff a tedious chore, and are apt to recruit computer staff in much the same way as they handle other staff, such as lathe operators and machine operators. Few personnel departments have the expertise to assess the potential of prospective computer staff.

The chief culprits of this method of recruitment tend to be the larger industrial and manufacturing industries, although they exist in most avenues of the computer using world.

The second category consists of users who have realised the potential of the operations department in providing a thorough grounding for a career in the computer industry. This type of firm tends to be the small to medium sized company, with a growing commitment to its data processing section.

Operations staff are actively encouraged to progress from operations into one of many other computer disciplines, such as technical support, programming or systems analysis. Facilities also exist for movement into a user environment area.

The third category, which has existed for many years, concerns the larger companies which offer specific training courses encompassing programming, systems work, and sometimes operating. Invariably this type of course is closed to non-graduate staff. This category of user is aiming to fill a specific requirement for a given number of development staff each year, and it could be argued that he is creating an "elite" section which is able to understand the complex problems of data processing, but does not have a complete understanding of the basics.

The prospective entrant to the industry must be aware of the pitfalls which await him if he is a career-minded person. The first category user, who recruits merely to fill a specific vacancy, and offers poor career prospects, may claim that he offers career prospects, but it is essential to the trainee that he ascertains to his own satisfaction that the company does offer a training course, with ample opportunities for promotion to those able to accept the challenge.

If an employer does offer a career scheme, then he will probably be keen to encourage the applicant to spend some time talking with staff already employed. This provides additional information to both the company and the applicant.

Meet the marathon man: Computer manager Tony Campbell, according to his company, bureau and systems house System Aid, has just watched his ICL 2903 clock up 10,000 hours' live operation. The company reassured us that they were not consecutive hours, although Campbell himself put it wearily, "Running on two shifts with only one operator at a time, we feel we know how to get the best out of both the machine and our people."

Siemens aims for office market

FOLLOWING the lead pioneered by ICL with the 2903, Siemens is recruiting staff for a major thrust into the small business systems and office markets.

The company has already announced a business version of the 300 series minicomputer, called the Sicomp-10, and a word processing system, the Siemens 580.

The German paper Computerwoche suggests that Siemens might also introduce a standalone version of its Transdata 920 floppy-disc-backed terminal system.

Siemens' chief interest is in winning a larger share of the business generated by distributed systems communicating with a mainframe.

Scicon wins North Sea gas study

MANY of the North Sea oil and gas fields are too small to justify the cost of their own gas collection and processing systems. But, recognising the potential value of the gas which is released as a by-product of oilfield exploitation, the government has prohibited the time-honoured process of burning it off.

The problem of economic recovery remains, and a company, Gas Gathering Pipelines, has been formed to study and report on the viability of collecting gas, and gas liquids, by means of a network linking all the small fields.

Appropriately it is Scicon, the consultancy and bureau owned by Britain's biggest oil company, BP, which has been called in to assist with the study.

Scicon is developing mathematical models to analyse the best way of putting together a pipeline network to feed the gas from several fields to an onshore processing plant.

Bus scheme

A PILOT scheme to computerise communications between central controllers and bus drivers has been put before the Greater London Council by London Transport.

The £250,000 scheme is a precursor to an estimated £10 million project to improve the efficiency of the London bus network.

A trial system is currently in operation using a microcomputer on a bus to provide the central controllers with scheduling data over a radio link.

Three Rs come before computers
—SAY COUNCILLORS

PLANS to upgrade a college computer at a cost of £12,000 so that secondary schools can use it, have been criticised by local councillors in Hillingdon, Middlesex, who say the money should be spent on improving primary school teaching of basics like reading, writing and arithmetic.

The access which 14 secondary schools now have to a computer is limited to a weekly turnround from Westfield College and a restricted service from Brunel University.

The council plans to upgrade a Data General Nova 2 at Uxbridge Technical College to improve the service to the 14 schools and give more schools access to a computer.

The council says the upgrade would also enable the college to start an A-level computer studies course.

But a Tory councillor, Phil Sawyer, who favoured spending the money on more basic education, said the facilities provided by Westfield College and Brunel were sufficient: "There is not one child in the borough who will be deprived of computer education if we don't go ahead with the scheme."

The council argued that present services were not good enough to support project work, which forms an important part of CSE courses run by the secondary schools.

The enhancements are due to be installed in October.

Datev bureau orders 3033s

THE big German tax bureau Datev, which claims 12,500 of the Federal Republic's 30,000 tax consultants, has ordered two of the big new IBM 3033 mainframes. It now has two 370/168s on long-term lease, and will buy one of them outright. The first 3033 is needed next year, but Datev expects that it will have to continue running the 168s for two more years.

Forty firms show their wares

COMPUTER applications for electronic displays will be the main theme of a two-day seminar to be held at the Mount Royal Hotel, Marble Arch, on September 6 and 7 as part of Electronic Displays 77.

The event also includes an exhibition of display equipment, running from September 6 to 8, involving about 40 firms.

The first day of the seminar will be devoted to computer graphics devices, systems and software. The second day concentrates on display components, including liquid crystal displays, LEDs and AC and DC electroluminescence.

The complete seminar costs £45 plus VAT.

Keeping things simple at the user/system interface.

It is still possible to buy computer equipment which seems fine until you build it into a system and get to work on programming. Then you begin to find limitations. Problems. Higher costs than you thought.

Ferranti Argus 700 computers were designed with the complete system in mind, by system builders. Particularly, they are designed for programmability. The software complements the hardware at all levels. We offer a family of operating systems that have common standards, span all general applications and are flexible enough to be tailored closely to system needs by customers themselves.

Programming in two high level languages—Coral 66 and Fortran IV—gives the advantages of economy of writing, clarity of information, security and the ability to update. And you get coding efficiency, easy maintenance, good documentation, and a robustness that means much less debugging.

Send for fuller details to:
Ferranti Limited, Wythenshawe, Manchester M22 5LA.
Telephone: 061-437 5391 Telex: 668084

FERRANTI
Argus 700 the system man's computer

FILE DESIGN Part 8 By Owen Hanson

Special purpose files

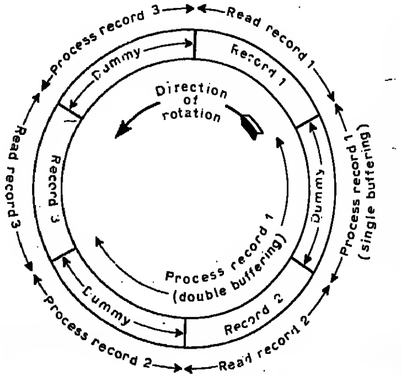


Figure 1. The arrangement of data records and dummy records on a track to ensure that no time is wasted due to rotational delay. If double buffers are used, Record 1 is available for processing and writing back until Record 3 is read.

SPECIAL purpose files can be divided into two groups. The first includes those files designed by users to meet their own specific needs, while the second is made up of specialist software provided by manufacturers or software houses to handle applications such as production planning.

An example of user-designed files is the case where there is a requirement for very rapid running of a sequential file, and processing times are significant, so the gap between records does not give sufficient time. Usually this will lead to a number of lost revolutions; this can be avoided by arranging the file as shown in Figure 1.

In this case the dummy records are made just long enough to allow processing and writing of the first record before the second becomes available, processing and writing of the second before the third becomes available and so on.

Double buffering allows more time for processing and writing records, and cuts down the amount of space needed for dummy records. This is also shown in Figure 1. They still waste a good deal of direct access storage, however, which has led to a further development of the technique.

Spiral files are arranged as shown in Figure 2. The first record is stored at the start of the first track, the second is placed far enough along the second track to ensure that it is not read until the processing and writing back of Record 1 is complete. Records are arranged on descending tracks in sequence until a record is reached that can be "fitted into" Track 1 closely following Record 1. In Figure 2 this is Record 8, and the spiral is repeated from this point.

The packing of data records that can be achieved is usually about 90%, and only in very fortunate cases can all the space on direct access storage be utilised.

Files designed on these or similar principles can produce very short run times, as rotational delays are virtually eliminated. However, such files suffer from a number of serious drawbacks.

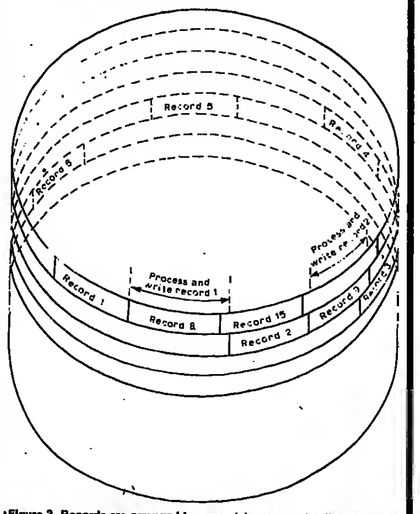


Figure 2. Records are arranged in a special pattern, the first on track one, the second on track two, and so on, until rotation of the disc allows a further record, in this case the eighth, to be placed on track one.

The first is that they are device dependent, and their performance can be ruined by transfer to another device.

The second is that the processing involved cannot be varied; once the file is "tuned" to give optimum performance, no additional jobs can be carried out without re-designing the file to adjust record positions. This means that such files are only suitable in a few cases, and are always "brittle" and invariable.

The second class of specialist files is very different. In recent years the use of computers in production control, production scheduling, calculation of materials processing requirements and the like, has become an important part of data processing.

Applications of this type often require complex chained or linked files. A reference to a particular machined part, for example, can be used to provide a list of the processes it passes through in the course of manufacture, or a breakdown of the assemblies it is used in, and in what quantities, in the manufacture of a finished product.

The user systems analyst responsible for such an application will be more involved in choice of alternatives than in true file design. Each manufacturer offers a distinctive set of products, and familiarity with a given package will allow the user to choose a minimum set of options that meet his requirements.

Variation of these options will allow an application to be effectively tuned, but it is important to start from a known base, and the minimum option set is the most convenient.

A serious trap lies in wait for the systems analyst here. It is best illustrated by an example. CLASS, Capacity Loading and Scheduling System, is used to schedule work more efficiently, and to reduce the amount of work-in-progress, WIP, on the shop-floor.

Management see WIP as capital and added value lying idle in the factory. The individual machine-minder sees it as his guarantee of there being a job for him next week. Unless he is convinced a system that cuts WIP will benefit him, shop-floor morale is endangered by any such system.

One company that installed CLASS found that initial reductions in WIP were followed by a general reduction in productivity followed by restoration of WIP to levels similar to those that applied before CLASS was installed.

Several cycles of this type were followed by the removal of the CLASS program from the installation. However, the failure was not a technical one. The systems analysts responsible for the program had not communicated with shop-floor workers, and failure was the price of this omission.

The file designer is not only responsible for the technical side of his work. In addition, he must allow for the impact on other members of the organisation, and ensure that they expect, and accept, the changes his work will cause.

SOFTWARE MADE IN SWITZERLAND

SYSTOR

a major European Software specialist based in Zurich.

More than 100 installations throughout Europe demonstrate the efficiency of our IBM and UNIVAC orientated Software (e.g. Data Base support, File processing, etc.).

We now intend to extend our fields to the U.K. market, the U.S. market and the rest of the world. We are looking for Agents to co-operate on a mutual basis.

Please contact: SYSTOR AG
Marketing-Dep.
Jungholzstrasse 43
CH-8050 Zurich
SWITZERLAND

AN AERIAL THAT ELIMINATES AERIALS!

Our illustration shows a BBC Research Department design for a ferrite rod aerial that receives v.h.f. and fits inside a portable radio set. It eliminates the external telescopic whip aerial, which has to be drawn out and adjusted, and so makes portable sets easier to use. You can read about this unique development in our September issue. Just one of the many 'break-through' articles you'll find in Wireless World, the comprehensive electronics journal. Another is a design for a very high quality laboratory oscillator, used for testing audio equipment, with a distortion level as low as 0.002%!

wireless world

Electronics ● Television ● Radio ● Audio

September issue Out now 40p

NEWS IN BRIEF

Fifty lose print jobs

ABOUT 50 production workers at Scottish and Universal Newspapers, one of Scotland's biggest newspaper groups, are to lose their jobs following a decision to shut three printing centres at Paisley, Kilmarnock and Ayr and move to a £1 million computerised plant at Irvine New Town, in Ayrshire.

The new plant will have photo-to-typesetting and web-offset facilities.

REDIFON Flight Simulation has sold its second civilian helicopter simulator to Helicopter Service A/S, of Stavanger, Norway. Based on a Rediffon 2000 computer, the Sikorsky S61B helicopter simulator will incorporate Novoview SPI night and dusk visual graphics, and a six-axis motion system.

TWO GEC 2050 RJE terminals have been installed by British Airways at Heathrow Airport. They are used for communicating with the IBM 370s at Bondicea House.

THE US-based manufacturer of magnetic tape drives for mini-computers, Digi-Data, has set up two subsidiaries in Europe. These are based at Brugg in Switzerland and at Maidenhead in UK. The Swiss company will sell directly in Switzerland and Germany and through distributors in France, Italy and Spain. The UK subsidiary will control distributors in Benelux and Scandinavia.

AN online version of SECUREX financial computer system originally designed by Lazard Brothers to handle contract calculation and maintenance and accounting for clients' investment portfolios, is to be marketed by CMG (City of London).

A TOTAL of 2,400 Avery 1725 digital weight scales have been ordered by Woolworth and Dewhursts from W & T Avery.

A DATABANK proposed by the Confederation of British Industry for use in advising companies on the best level for wage settlements during the next round of wage negotiations is to be a completely manual system, and according to the CBI, it will be more a counselling service than a monitoring one.

PLANS for the House of Commons library computer system, as expected, did not progress any further before Parliament rose for the summer recess. An attempt was made to have the proposals of the joint Lords/Commons committee on the topic accepted without debate, but this failed.

TYNESIDE machine tool manufacturer Noble and Lund has ordered a £10,000 visible record computer from Philips Data Systems. Extensive use of the Philips Software Library is planned.

A GENERAL Automation engine test-bed automation system has been installed at the Mobil Oil at its Research and Technical Services Laboratory at Coryton, Essex. It features a 16-bit GA-16/440 mini which is used to control a multi-engine test area as part of Mobil's research and development programme.

A GEC 4070 processor will shortly be installed at the GKN Technological Centre, in Wolverhampton. Equipped with 96 kilobytes of core store and costing over £88,000, it will replace the existing Elliott 903 system.

COMPUTERS AND ACCOUNTANT

Accountancy, one of the most respected professions, is traditionally linked with book-keeping — looking after the ledgers, working out the payroll.

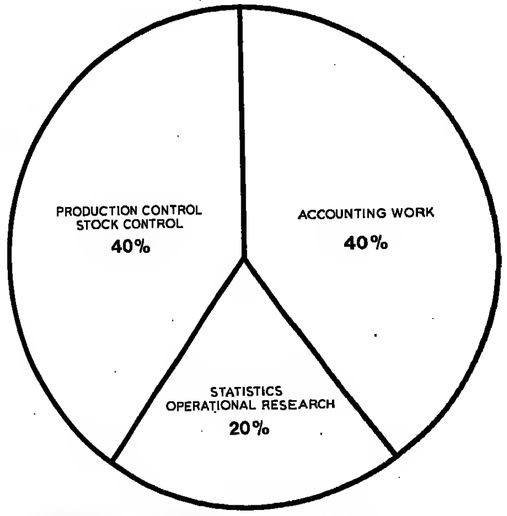
But the introduction of computers not only makes the accountant's job easier in these traditional areas but opens new paths in the fields of financial modelling, corporate planning and costing.

As John Ambler says in this opening article, accountancy departments are ideally suited to computing because they are already well structured, disciplined and used to working to high levels of accuracy.

This supplement looks at old and new applications, for computers in accountancy departments. Ambler sets the scene with a look at the growth of the use of computers by accountants, a review of some of the common applications and a glimpse of the future, while other writers describe systems handling applications ranging from pensions to modelling and royalties for pop groups.

Applications wheel turns full circle

By John Ambler



Distribution of DP effort, including computer time and design costs.

THOSE of us with a long tooth in computing can recall with ease — and occasionally affection — those far off days when the computer was the accountant's toy. The financial director or chief accountant was considered the "natural" man to head the computing activity: as one MD said, "he is the figure man isn't he?" as if this was all the justification needed.

It was true in those days that much of the work the computer tackled was accounting: payroll, ledgers, costing and the like. Of course, the real reasons for computerising these tasks were rarely advanced: they were already structured, disciplined activities; the accountant's department had become naturally used to working accurately and against time pressures; and the pay-offs associated with large staffs and volumes and non-fragmented jobs were substantial.

The wheel has well-nigh turned full circle, at least as for as applications are concerned. In 1960, the post-tax real rate of return was 9.7%, compared with 2.9% in 1976.

Not only are we short of profit, but liquidity is tight and interest rates high. The Price Commission's rules have superimposed a new set of cuts on top of "actual costs", "standard costs", and "historical costs" — whatever they are. Every year brings more requirements in the way of disclosure: segmental accounting, revaluation of assets, and whatever we are required to do for inflation accounting Mark 4.

The number of qualified accountants has decreased to the point where some authorities are asking if there is a natural upper limit to their numbers in any given economy. But it is the unqualified, but experienced, accounts clerk who makes or breaks any accounting system. Both these groups have added weight to the inevitable pressure from the top to computerise more work.

There are maybe 50,000 businesses in the UK with between 25 and 500 staff, who could usefully benefit from running a set of integrated ledgers, invoicing and order entry and — at an all up cost of say £35,000, including external help.

At the other end of the scale, the top 5,000 organisations could well benefit from the phased changeover to generalised accountancy packages, covering budgets, projects, multi-company groups, foreign currencies, and the like.

In between, there is enormous scope to profit from the use of models of all kinds.

For a trading organisation, the applications are fairly standard:

- Payroll
- purchase ledger
- sales ledger (including perhaps order entry and probably invoicing)
- general ledger (including budgets, overhead control, etc)
- fixed asset accounting

In his ten years at PA Computers and Telecommunications John Ambler has specialised in the application of computers to finance and accountancy. In 1971, he served on the government working party on the design of a computerised system for PAYE and was on the accounting working party studying the implications of VAT for the Institute of Cost and Management Accountants.

Ambler is a Fellow of the Institute of Cost and Management Accountants, a holder of the joint diploma for Management Accounting and Fellow of the British Computer Society.

- costing (model costing, stock movements and evaluations, etc)
- models (both long range company financial models and shorter term models covering such aspects as liquidity planning and control)

Payroll must be one of the most unloved DP applications, but it is almost certainly the commonest, and few organisations could return to a manual system. Good and well tried packages are firmly established. Of course, there are substantial problems in each organisation in computerising work bookings, team output, and direct workers' indirect expenditure.

Purchase and sales ledgers are possibly the least interesting accounting applications to the DP professional: it is unlikely that he will be able to design a system as cheaply as he can buy one "off the peg", although there are still accountants about who insist that their ledger systems follow every quirk of the displaced manual procedures.

General ledger can cover anything from the one code trial balance system to the mammoth one which reports actuals versus flexed budget, and can even compute internal service charges. Development in this area over the last five years has been substantial. There are some exceptionally subtle and powerful systems on the market. Here, however, one of the problems is that it is extremely difficult to determine the power and flexibility of such a system from the sales literature.

Fixed asset accounting is an application which has come well to the fore recently, impelled partly by inflation accounting.

Costing is the area for excellence where the good systems designer comes into his own. It is one of the paradoxes of a good costing system that the main part of the effort has nothing to do with accounting: it is a entirely dependent on product structure and updating.

A product specification file may be turned over as quickly as every three months by new models and modifications. Adding standard and "current" costs to a file with such a high degree of volatility is reminiscent of jumping from one moving roundabout to another.

Finally, models. These can vary in size from the five line Basic program to the most enormous and complex matrix based systems. However, they are tailor-made to solve a problem identified and specified by an accountant.

The analysis so far has been applications oriented. An equally interesting way of dividing the area is by user.

At the top are, of course, the financial director and his colleagues on the board. None of these is particularly interested in, for example, the general ledger.

However, the tailor-made Basic or Fortran model can capture their interest and even sidetrack them from more important, if mundane, tasks to a remarkable extent. Accountants beware!

The second user group are the purchase and sales ledger clerks, and their opposite numbers outside.

The third important group covers all those who input or use costs. Nearly all of us are to be counted in this group during part of our working lives.

A final important user group comprises the professional accountant in his auditing capacity.

Accountants have for many years been fascinated by the machinery on offer to solve their technical problems. Investment was once readily made in unit record equipment — data preparation, card sorting, and tabulating. Many accountants then pursued their careers in "information processing."

One of the characteristics of computer development in the last five years is the matching of hardware to local needs. The old organisational rule of "centralise what you must, decentralise what you can" has found application in computing.

The typical manufacturing establishment, even in a large group, does not employ 10,000 staff: 500 is a much more representative figure. Such an organisation has its own rules and procedures, and accountancy timetables.

To meet the real life structure of such large and medium size enterprises, manufacturers are now offering distributed processing, and minicomputers with full accounting software.

All the evidence points to the fact that the accounting requirements of both large and small firms are growing at the same rate.

Hence the global total of accounting applications neither directed themselves towards or against large mainframes or local minis.

Undoubtedly, some sad experiences with VRCs will deter some accountants. Still, a buyer of a calculator at £20 which failed is not likely to refuse a machine twice as powerful costing £10.

Such blind alleys are one price of progress. The accountant's judgment must always be to postpone choosing the high technology solution (except at another's cost and risk), and to go for the simple and the proven. While not an innovator himself, he is often in the vanguard of those following the successful innovator.

The 1971 Miles Roman "Computing Usage Survey" showed that accounting applications had a higher success index (0.82 on a 0 to 1 scale) than statistics (0.75) on production control (0.66). These success ratings were higher irrespective of the reporting point of DP in the hierarchy; although naturally financial directors claimed an above average success rate.

Will the high percentage of accounting work continue? Will it continue to have an above average success rate?

I believe that the answer to both these questions is 'yes', and here are the admittedly contentious reasons why.

Before computing existed, accountancy was intricately associated with the means of producing accounting data as well as the ends. There has been a period when apparently both professions have diverged. I do not believe they will coalesce, but I do think that the transfer from one occupation to the other — and back again — is a natural one, and it could well be on the increase.

Accountancy will continue to be an activity which is at once both nearer the detail user (itself a guarantee of above average success) and the strategy making part of the organisation structure.

Finally, the accountant's dominant position in "information processing" is enhanced by the use of DP, not fragmented.

While there are not exactly new applications, there are new starts to old approaches and systems.

Modelling is one area where the sky appears to be the limit: here the accountant, the OR man, and the DP specialist can usefully collaborate.

In the Miles Roman sample, two thirds of firms had computerised nominal ledgers, and only 40% coat ledgers. Existing users have a long way to go.

S.N.A.
Hutchinson-Scoggins announce the 1st S.N.A. Internals course available to the public

This 5 day course is designed to tell systems programmers what S.N.A. is really all about.

date: 3rd-7th OCTOBER 1977
venue: EUROPA HOTEL LONDON W1

For full details including syllabus and booking form ring Brian Burch on 01-499 4501 or write to the address below

YOU ARE ADVISED TO BOOK EARLY AS THERE ARE ONLY 12 PLACES PER COURSE

hutchinson-scoggins technical support
10 Dover Street, London W1X 3PH 01-499 4501

Keeping TRACS on pop music business

THE Chrysalis Group has come a long way since it was set up as an entertainment agency in 1968. From specialising in booking rock and roll artists, it has moved through artist management into record production and distribution, music publishing, and recently record studios. But it is for its record activities that Chrysalis is best known.

The early record releases were all progressive or "heavy" rock but the company's recent policy has been to broaden the basis of its product so that now the label has artists like Leo Sayer, Jethro Tull, Steeleye Span, Frankie Miller and Robin Trower.

"Each year we release about 40 albums, together with an equivalent number of singles. The catalogue available from Chrysalis has been steadily accumulating and continues to sell strongly. Aqualung by Jethro Tull, for example, was released in 1971, but it still sells 10,000 copies a month around the world," explains Terry Connolly, Chrysalis' deputy group managing director.

Yet the Chrysalis world of rock and pop is not all glamour. Behind the group's success is an astute awareness of the importance of strong accountancy methods and sound business management, backed by a willingness to make use of the latest techniques.

Stealeye Span is just one of the famous names on the Chrysalis record label. Yet the group's world of rock and pop is not all glamour. Royalty analysis and distribution of income between artists was handled manually, until CMG was called in as consultants. The end result was Total Royalty Accounting System — or TRACS. Apart from solving the workload problem, this system has enabled Chrysalis to provide much more information to artists, writers and producers — as well as to management itself.

One of the biggest problems in the record business is tracking royalty and copyright payments. When an album is sold, a percentage of the revenue is allocated to a number of people: the artist performing the album track, the producer, the song publisher and writer. No matter where the album is sold, in the UK, the US or Europe, the income is channelled into Chrysalis for distribution.

For a number of years all this royalty analysis and division between artists was carried out manually, while the overall accounting function was dealt with by an NCR accounting machine. But as the group expanded it became increasingly difficult to handle the workload.

It was decided to bring in a minicomputer and CMG was called in as consultants. Part of the brief was to consider a bureau service for all operations. CMG recommended that a bureau system should be developed to handle royalties and copyright while the accounting routine should go on to an office computer.

For this work a Kienzler 2000 was installed and this handles bought ledger, credit transfer, VAT summaries and payroll. It is also used to produce analyses of company operation and credit control.

After accepting CMG's recommendations and moving away from installation of a mini computer, quotes were obtained for development of the bureau royalties system. "We stayed with CMG and the end result was Total Royalty Accounting System, TRACS," says Terry Connolly.

The impact of TRACS on Chrysalis was remarkable. Apart from solving the workload problem, the system enabled the company to provide much more information to artists, writers and producers — as well as to the management itself.

From reports produced at CMG (West End), managers obtain an up-to-data picture of album sales by territory, broken down under such headings as amounts due to each artist, summary of sales and receipts and so on, analysed from information held on master files at the Croydon data centre.

In common with the majority of computer users, Terry Connolly was intent on gaining the potential benefits of the system as economically as possible. One of the best ways to do so is to use a package — a ready written programme of which development costs have been shared by a number of customers.

Unfortunately TRACS had to be developed right from scratch, and the final costs promised to be quite high. So it was decided that the system would be specifically written in a package form that would handle royalties, copyright and music publishing for a range of organisations in businesses similar to Chrysalis. TRACS would then be marketed as a joint project between Chrysalis and CMG.

"This arrangement had two effects. First, it enabled us to recover a proportion of the development costs. And second, it added a strong sense of discipline. It stopped us from becoming self-indulgent in the type of information we wanted from the package. Everything produced is of value. We had no room for frills," added Connolly.

This approach has certainly proved successful. Apart from Chrysalis which uses it to account to 50 artists, numerous producers and several hundred writers, TRACS is running as a bureau service for a number of other organisations such as United Artists, Virgin Records, Anakarta and RAK Publishing.

The package itself is divided into three separate modules — TRACS 1, 2 and 3 — which may be run separately or linked together.

TRAC 1 covers artist royalties. It converts all revenue into sterling regardless of currency type and calculates the amount due to each artist and producer. Artist/producer royalty statments; a summary of sales and receipts showing the amount payable for each album together with a total by each artist; and a breakdown of sales by territory for each album, are all supplied automatically.

TRAC 2 — the copyright system — calculates the copyright due for each track and prints copyright statements for each publisher or writer, as well as a summary showing the grand amount due.

TRAC 3 is the music publishing system that calculates the amount due to each writer automatically applying any of the five different percentages according to the type of receipt. The computer then produces writer statements, a summary of receipts by song within writer and a summary of the gross due to each writer or account.

Since the system went live in 1975, it has been further improved by the addition of supplementary reports such as analyses of expected and outstanding payments on a particular song and a cumulative sales report. Clients also have the option to produce selective statements, returns, artist and producer summaries and a condensed album catalogue. Other items include foreign currency statements and reports, as well as lists of albums, songs, artists, writers, publishers, licensees and territories.

Connolly is now looking towards marketing TRACS in the US and Europe. "It is already available on the Continent but we would really like to market the system in the US. There are hundreds of smaller record companies and publishers that could well make use of TRACS now that it is fully operational."

Our new computer firesafes give big protection for even the smallest user

Our range is designed for the mini as well as the maxi user. In fact we make the smallest computer firesafe in Europe, if you need it. All models include protection for word-processing systems.

So just select the safe that suits your requirements. You'll find it fully adaptable for combination storage of mixed media and you know you can rely on its protection properties because it's made to Stratford standards and independently tested.

For the full story contact Stratford Safe Co. Ltd., Borehamwood, Hertfordshire or ring U.K. Sales 01-353 9433/4311.

Stratford Firesafes

Streamline paperwork to give better service

AIDS (Accounting Information Development Service) which provides a computer based service for accountants in both practice and commerce, is a company run by three young chartered accountants, Mike Salinger, Peter Ranoe and Laurence Scodle. They believe they are the only accountants wholly employed in this area of work, and are particularly concerned that practising accountants improve the profitability of their practice by providing a far more prompt and efficient service to clients.

The service is based on the principle of regular accounting, wherever practical, thus providing accountants with a basis for regular billing, and clients with up-to-date information.

AIDS operation is run from their Grays Inn Road offices, and has been based upon card punching data preparation, but due to the rapidly expanding volume of business they are looking forward in October to changing over to the Redifon Seecheck system.

The company is conscious of the need to reduce the superfluous paper that many systems produce, although every effort is made to ensure that all reports and printouts are produced in duplicate and presented to clients in specially designed bindars and folders.

AIDS services are essentially for businesses which are not in a position to contemplate having their own in-house hardware.

Most of these small and medium-sized firms are using either manual or basic mechanised accounting systems. AIDS recognises that in these inflationary days, bookkeepers' and accountants' time should not be involved in unnecessary manual analysis, ledger postings, etc.

Thousands of businesses in this country are required to keep books of account for Customs and Excise, the Inspector of Taxes and their auditors, but very little use is being made of the information by the business itself.

Through AIDS' association with the Accounting Corporation of America (ACA), which services more than 2,000 firms of accountants in the US, they have learned the need for a flexible coding format to keep pace with the requirements of the many types of clients that need regular accounts.

The businesses vary from schools, holiday camps and newspapers to restaurants and pop groups. The flexibility of the service provides clients with their own chart of accounts, and a personalised presentation of their financial reports.

The main reasons that most accountants are unable to service many of their clients are:

- They are overworked due to the external pressures put on them by government legislation; for example the filing of statutory accounts within 10 months of the end of each company's financial year, the necessity to submit VAT returns within one month of every quarter and new regulations concerning the submission of personal tax returns;
- The shortage of good and experienced clerks is causing an acute problem due to the escalating salaries that are necessary to attract them, and
- Due to the high turnover of staff clients often find that different clerks are preparing their accounts each year. The only continuity is the partner, who is usually overburdened with clients' problems.

During the next two or three years accountants must commit themselves to improving the service available to all clients. Businesses generally suffer greatly from lack of financial and management advice.

Accountants are capable and properly trained, but do not have adequate information to make the necessary decisions or forecasts to assist when required. Practices should gear themselves up to providing more of their clients with regular accounts, monthly quarterly, etc, by spending a certain amount of time improving the clients' bookkeeping/accounting systems to produce automatically the necessary detail. It is unacceptable for clients to bear the cost of a clerk at £7 or £8 an hour where, with a little more thought and expertise, the client could be balancing his own books and preparing his own accounts.

Unless accountants can streamline the mass of paperwork that is flowing in and out of their offices, they are not going to be in a position to service their clients regularly and efficiently.

Corporate modelling to aid business and financial projection

By Nigel Chidley

It is now possible to go to a bureau, produce a corporate model of an individual company, and obtain the likely effects of items such as government legislation, says Nigel Chidley, manager of the Business Systems Division of Scicon Computer Services.

He also points out that actual performance can be monitored against forecast at frequent intervals, and the business plan altered to take account of the changes.

FROM the earliest days the accountant has seen the computer as an important book keeping aid. Indeed, it is frequently said, with truth, that many organisations could no longer continue to function without their automated invoicing, credit control, purchase ledger and payroll systems.

In the more "advanced" companies much of the data required, updated and produced for these applications is integrated to enable detailed management information to be presented over a wide range of their activities.

Yet comprehensive as many of these systems are, they really only represent a start to realising the computer's potential as an aid to planning and running a company in an increasingly complex world. For today many factors that are completely out of a company's control can affect the business to an astonishing extent, for good or ill.

For example, how many accurately forecast, four years ago, the explosion of energy costs and its effect on their business? And how many understand the effects that are likely if current wage and salary claims from various sections of industry are met in full or, indeed, if partial-settlements are reached?

Answering questions such as these, and the hundreds of the more mundane but equally valid ones that in some way affect every organisation, within a timescale that enables appropriate action to be taken, provides the computer with a vital role in business development.

The idea of producing a corporate model and then asking a series of "what if?" questions is by no means new. The techniques involved have been used for many years in the process control environment and are well tried and proven. And an increasing number of organisations are now applying them to the company as a whole in a bid to evaluate the alternative courses of action open to them.

There are a number of reasons why business modelling and forecasting is now gaining momentum. For a start, the money "at risk" if a mistake is made has increased out of all proportion during the last few years. And, as a result of the pioneering efforts of a number of enlightened companies, there is now considerable experience in designing and implementing corporate models.

Equally importantly, a variety of databases are now becoming generally available, enabling the user to "project" his company against economic and industrial trends. In this way he has access to accurate and up-to-date information which would be prohibitively expensive for an individual company to obtain and to maintain.

One of the earliest commonly available systems was the Share Price Databank which holds five years weekly data on share price, dividend yield and the P/E ratio. This has proved remarkably accurate in spotting trends and, because it uses essentially the same techniques, can be considered as a highly successful prototype for the later, less specialised models now being used for a wide variety of economic forecasting.

One of the most important of these is the Treasury Macro-Economic Model which is currently used by the Treasury to provide forecasts of the UK economy for up to two years ahead, with medium term assessments of up to five years ahead. One of its key roles is in the measurement of the sensitivity of the economy to policy changes, enabling more efficient and rapid judgments of the effect of government budgets and new legislation.

The model itself contains more than 800 variables and several hundred equations, including both identities and empirically fitted casual relationships. For the latter, the model devises best-fitting coefficients from the historical data provided and balances up the results to meet the various accounting requirements. This set of co-efficients is then used to forecast the situation for a pre-set number of quarters for given assumptions.

It should be remembered that actual forecasts produced using the model would not be "Treasury forecasts". The results obtained are derived from the combination of a user's specific assumptions about a variety of forecasts such as tax rates, and the model of how these affect the economic situation.

The Central Statistical Office Databank which contains more than 1,800 macro-economic time series, is also proving a significant aid to business forecasting. It is updated every month from verified data supplied by the Central Statistical Office.

Industrial production; national incomes; expenditure; balance of payments; prices; wages and earnings; and population and manpower are the main headings covered. They are available at annual, quarterly and monthly frequencies.

A further database of particular value on the investment side is the corporate database. This contains details of company accounts for the past five years and is particularly useful for identifying trends within specific industry areas.

As with virtually all computer applications, the success or otherwise of business modelling systems is determined almost entirely by the skill and effort invested at the beginning. It is a highly specialised field, but fortunately, as discussed earlier, it is one where there is now considerable expertise available to the organisation embarking on this route for the first time.

Although it is vital that the user defines his requirements extremely closely, it is not advisable to design the systems exclusively to meet those needs. For the object of the exercise is to plan for the future and there is no feasible way that a human being is able to foresee every possible contingency in that area.

Our experience shows that modelling of this type is best carried out in an interactive time sharing environment. By using a terminal, a number of theories can be tested simply by typing in changes in the criteria and pressing a button. And the answer can be received as a tabulation, a line plot, scatter diagram, a histogram or, indeed, in virtually any form required. All that the operator requires to know is the capability of the system and the questions he wants to put.

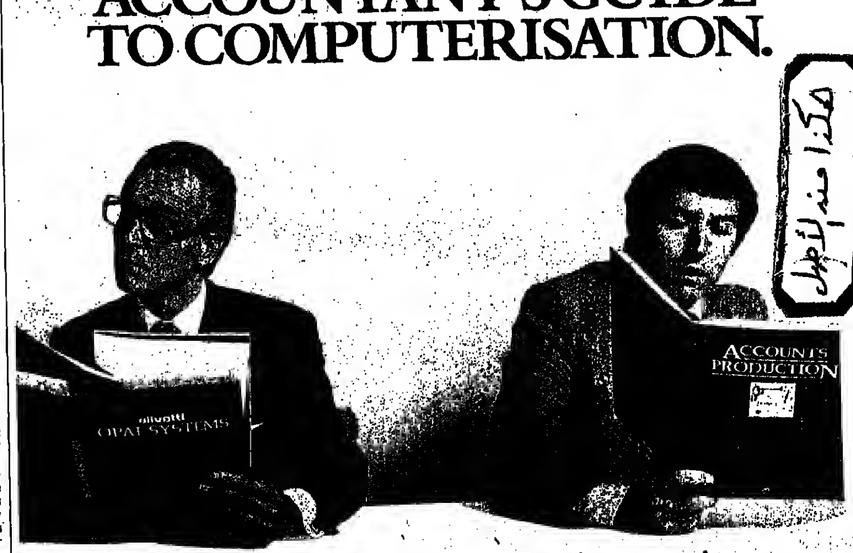
The use of terminals and the availability of databases means that the research department of the large organisation is now able to concentrate on the interpretation of information instead of spending most of its time simply collecting it.

And the smaller company, which does not have the resources or the desire to afford the high level of expenditure previously required, can now obtain the benefits of business modelling at economic rates. For most managing directors know exactly what information they require for their own corporate plans but have not previously been able to take into account the wider implications of outside factors.

However, it is now possible to go to a computer bureau, produce a corporate model of the individual company, and obtain the likely effects of items such as government legislation. Just as importantly actual performance can be monitored against forecast at frequent intervals, and the business plan altered to take into account the changes.

Today the role of the accountant is more than that of a book keeper. He is required to advise and implement over a wide area of financial management and planning. With business modelling and forecasting systems, the computer industry is proving its awareness of his problems, and providing the means of dealing with them.

THE BUSY ACCOUNTANT'S GUIDE TO COMPUTERISATION.



In commerce and industry.

Olivetti have prepared a comprehensive set of briefing booklets for the company accountant.

This set of booklets includes guides to computer programs covering Sales Ledger, Purchase Ledger and Nominal Ledger procedures.

If your company's accounting is your concern, these booklets are required reading.

For your complimentary copies, ask your secretary to send this coupon, or write to:

Peter White, British Olivetti Ltd., 30 Berkeley Square, London W1X 6AH.

Name
Position
Partnership
Address

cw olivetti

In private practice.

Olivetti have evolved a computer approach to the accounts production function.

Prepared in consultation with accountants, this system is one of the applications in the library of Olivetti computer programs for accountants in private practice.

Within the range are systems to suit individual practitioners, medium size partnerships and large concerns.

For a complimentary briefing booklet on Olivetti's approach to accounts production (or if you'd like to see the special documentary film on incomplete records), ask your secretary to send this coupon, or to write to:

Peter White, British Olivetti Ltd., 30 Berkeley Square, London W1X 6AH.

Name
Position
Partnership
Address

cw olivetti

Computerised pensions administration

By Gershon Lipschitz

WHEN pension schemes started, they were, looking back, very simple to run. As time passed, sophistication crept in. Design of benefits became increasingly sophisticated and tax concessions increased. Simultaneously, governments became more concerned about pensions because of social implications.

Today running a pension scheme can be a complicated business. Not only is it necessary to have at your fingertips details about current members and current benefits, but also information about previous schemes in which members were involved and details of persons who have retired or left your service.

Quite clearly the storage and retrieval of large blocks of information is ideally suited to computers. Sedgwick Forbes Employee Benefits Consultants, a specialist company within the Sedgwick Forbes Insurance broking group dealing with pensions and other employee benefits, has a computerised administration system for administering pension schemes, both for its own use, and for sale for use by other companies.

They had for some time administered pension schemes on a manual basis. There was no file maintained with all the data held and regularly updated. The system worked effectively, but as reports with updated information were required each year, it meant that all the data had to be fed into the computer each year to produce a report. Added to this was the fact that major Social Security legislation was due to come into force in April 1978.

The legislation required that in a number of cases it would be necessary to have data which should be available from the Department of Health and Social Security. Sedgwick Forbes, in common with most other consultants, was sceptical about how quickly this data would be forthcoming, and so decided that they must be in a position to produce the information for themselves.

Because of time restrictions — the system would have to be operational by the end of 1977 at the latest — it would have made sense to buy a package, but no such package existed at the time. So, in conjunction with Pensions and Insurance Computer Services — a special pensions software house — a system was designed and is now operational.

There were a number of problems to overcome at the design stage. From the pension point of view, the system had to be broad based enough to be able to store information for a number of differing pension schemes, for Sedgwick Forbes' own use, and be adaptable to other people's pension schemes. In order to obtain complete flexibility the concept of a "scheme module" was created. The "scheme module" described the features special to each scheme and is accessible to a number of different programs. One module is written for each scheme. The result is a system wider than one purely parameter driven.

Each member can have a record which, if all possible variations are present, is quite long. By putting all the information on file, all data can be used because it is readily accessible. This is a very useful tool, not only for pension administrators but, if the necessary details are on file, and there is room for them, for personnel departments too. This is an area which is not often appreciated, and one central source of group personnel data is often ignored, or its usefulness goes unappreciated.

The system differs from the usual insurance company administration, which is normally geared to the features of that company's operations only. It is fair to say that any pension scheme's records can be stored, retrieved and manipulated on the Sedgwick Forbes' system. This is its unique feature.

There were also technical problems. Should the files have random access, or should it be accessed sequentially? There are advantages in both but it was eventually decided that operating in sequence was the answer. Should files be held on tape or disc?

During the writing of the system, a major job, it became apparent that the system would be larger than originally envisaged. When completed it contained over 20,000 procedure division statements.

All information necessary to run a pension scheme is held on file. Collecting the data and then ensuring its accuracy is always a problem. It is amazing how much information which should be known, is not available.

There are a number of error indicators and warnings thrown up in editing input, some of which are generalised (for example, that a supposed month numeral is in the range 1-12) and some of which are scheme specific (a certain data, say the date of entry to a scheme must be after, say, January 1, 1960).

Each year, or more frequently if required, the file is updated by putting on information which changes, such as salary, deleting those members who need not be on file and inputting new entrants. It is possible to use data file produced for other purposes, eg, for the Inland Revenue or DHSS, to update "existing members" records. Other changes are also recorded, such as change of status, change of name (for married woman), divorces, deaths, etc. Members' contribution histories are updated, and where appropriate interest credited. Updating can be done as frequently as necessary.

If a member changes status for instance leaves service but retains a frozen pension in the scheme, and say then dies leaving a widow's pension to be payable (another change of status), records are held on the file all the time, and the change is easily dealt with, both in terms of changing the file, and in keeping the scheme administrator informed as changes go through.

Reports are produced. These would include details of "live" members, deletions from the file, changes to the file, retirements due to occur in the next two years, deaths that have occurred and any other special reports required. Ready production of this information enables the administrator and the company to be in full control of its pension scheme. Extracts can be taken off the file for use in actuarial valuations. Where a computer file is not held, production of such data can be an arduous process.

The production of individual employee benefit statement is a natural by-product of such a system. These are statements issued on a regular basis which inform the member of his own benefits under the scheme. This is not in fact done directly by the system itself though, of course, it could be, but, by means of an extract, separate programs do the work. These programs to produce benefit statements are part of an existing system within the data processing department. Without having the information on a computer, this would be quite difficult.

Future developments are already planned. April 1978 is a watershed in the pensions world. Thereafter, the system will be extended to do benefit calculations for individual members at the time of retirement, withdrawal or death. It will be desirable to have a standardised interface with the main payroll systems — Unipay and Q-Pack. From there, who knows?

This system has been written for an IBM machine in Cobol but can naturally be converted to cover other machines.

Running a pension scheme can be a complicated business, says Gershon Lipschitz, who is assistant director of Sedgwick Forbes Employee Benefits Consultants. Here he describes how his company set up a computerised system for administering pension schemes, and he looks forward to April, 1978 — "a watershed in the pensions world."

Lipschitz was educated in South Africa, and worked for an insurance company there before coming to the UK in 1970. He was with a leading firm of consulting actuaries before joining Sedgwick Forbes in 1973, and he qualified as a Fellow of the Faculty of Actuaries in 1972.

COMPEC '77 keeps on getting bigger!

Demand for space is so heavy that we have persuaded the GLC to let us use extra space at the Wembley Centre, and that gives us 40 stands in addition to the original 180. That takes care of the waiting list and gives us a few — a very few — spare stands on offer. Telephone Chris Timmins at 01-261 8437 to reserve one of them.

COMPEC '77 — seventh year of the specialist computer, terminals, microprocessors, systems and hardware exhibition.

Organised for the sponsors by Iliffe Promotions Ltd, Room 821, Dorset House Stamford Street London, SE1 9LU

'Set up a national CAL centre' call

NEW manufacturing and business methods and changing patterns of employment could create new opportunities for computer assisted learning, but unless there is a dramatic change in organisations' attitude to CAL, industry will lag far behind education and military training in these methods in the 1980s.

So says a report* on computers in industrial training and management development, produced by the National Development Programme in Computer Assisted Learning.

The problem, said the report, is that industrial training has relatively little experience of CAL and has hardly begun to exploit its potential.

The report gives several reasons for this: Industrial training is a vast unco-ordinated field where innovations cannot be spread easily. Early exaggerated claims that CAL could replace teachers have created suspicion of these methods. Few training departments have enough computing experience. And commercial interests such as demand for minimum costs and immediate results, together with the existence of cheap audio-visual aids, make the current attitude to CAL "not too surprising".

The reasons add up to lack of knowledge of the potential of CAL, and the report calls for the creation of a national centre to collect and hand out information and, if enough money is available, to pilot applications and co-ordinate research.

The need for CAL techniques is clear, according to the report. There is a growing use of computers in industry, a greater need for planning, fault finding and problem solving skills, and a demand for maintenance and process control skills as automation and sophisticated technology change the manufacturing and production industries.

At the same time, as manpower becomes more expensive, there is a need for training systems which develop individual abilities fully, and quickly react to weaknesses to avoid wasted effort.

In all these areas CAL was proven through systems developed in universities, colleges and military training establishments.

And, says the report, there is no evidence of CAL being used on an intensive scale and found inappropriate.

Criticism of the report has come from Neil Spoonley, who is responsible for marketing Control Data's Plato computer assisted instruction system in the UK.

He said it ignored all the US experience in CAL and only made brief mention of systems like Plato and IBM's Interactive Training System.

Roger Miles, assistant director of the national programme and author of the report, said there was very little published material on US systems and that no data on their cost-effectiveness was available.

*Computers in Industrial Training and Management Development in the 1980s, by Roger Miles. 37 pp. 75p. National Development Programme in Computer Assisted Learning, 37-41 Mortimer Street, London W1N 7RJ.

Plato on show

The computer aided instruction system Plato, developed by Control Data, will be available for demonstrations in the UK in October. And next year a Cyber mainframe will be installed in Brussels to handle a European service. UK marketing is being handled by Neil Spoonley, formerly director of the University of London Computer Centre.

Go-ahead for AT&T switched data service

THE US Federal Communications Commission has authorised AT&T to go ahead with a switched data service which would compete with the services offered by "value-added" carriers like Telenet.

Called Dataphone Switched Digital Service, DSDS, the AT&T system would link 27 cities carrying data at 56K-baud only.

DSDS is unrelated to the Bell Data Network which AT&T is planning. This would allow users to communicate with the network using a very high level language, and would involve AT&T in large amounts of DP.

Contesting AT&T's application for DSDS, Telenet asked that the company be required to set up a separate subsidiary to run it. The FCC ruled that this would be inappropriate for one service, but is considering whether AT&T should form a separate subsidiary to handle all its data services.

"Our submission was not rejected," a Telenet spokesman told Computer Weekly. "We believe that the FCC is moving in the right direction."

Nixdorf plans D116 replacement to be made by US subsidiary

PREPARING for the day when Data General phases out production of the D116 minicomputer — expected to occur once existing orders are completed — Nixdorf is planning to use its newly acquired US subsidiary, Entrex Corp of Burlington, Massachusetts to manufacture an alternative to the D116.

Entrex manufactures key-to-disc systems based on the D116 and Nixdorf also uses the mini in small versions of its 8870 business computer.

Uncertainty over the future of the D116 following Data General's acquisition of its originator, Digital Computer Controls, persuaded Nixdorf to design its own processor, which is code-compatible with the D116.

Data General acquired DCC thus ending a series of law suits in which it was alleged that the D116 was an illegal copy of the Data General Nova 1200. Data General is now investigating the Nixdorf-designed mini to determine whether it has grounds for a similar law suit against Nixdorf.

Zilog software package

ZILOG has introduced a complete graphics software package for the Z-80 microcomputer system, or any system using the Z-80 based family of microcomputer boards.

It offers the generation, printing and display of complex images comprising any combination of vectors, points and variable location characters with user-definable shapes and sizes.

For hard copy output, the package is designed for use with a low cost printer, having a resolution of 560 and 288 points in X and Y respectively.

Networks explained

A TEACHING package* on networks, designed for self instruction or for a classroom course, has been produced by the National Computing Centre.

The package comprises a complete set of lecture notes and visual aids. The lecture notes include indications of the expected responses from students, and advise the teacher when to show visual aids, use the blackboard and issue exercises.

*Networks Explained, by Fred Offer, 482 pp, £16. Available from technical booksellers or from J. M. Dent and Sons (Distribution) Ltd, Dunhams Lane, Letchworth, Herts (postage £1).

The traffic control system covering Merseyside is due to move into its second phase next month when road junctions outside Liverpool begin to be brought online.

Based on a Plessey XL9 central processor with Digital Equipment PDP 11/20s as frontends and four PDP 11/05 as satellites, the system at present controls over 200 sets of traffic lights in Liverpool. As busy junctions and bottlenecks there is TV camera surveillance which enables the operators in the control central room (pictured above) to adjust the system to cope with traffic packs and holdups.

The second phase will extend traffic light control to Birkenhead, the Wirral, Sootle, St Helens, Southport and Maxley.

To improve the system Merseyside County Council is using a Computer Automation Alpha LS1-2 in an experiment in dynamic traffic control. The mini is located in a caravan near road systems where congestion is likely to occur. Traffic flow through up to seven junctions is supervised, and the lights are adjusted to prevailing conditions. This provides a flexibility not yet possible on the mainframe.

A second Alpha mini is being used to provide an emergency "freeway" system. Should it be necessary to move a vehicle, such as an ambulance or fire engine, quickly through a section of the city, the Alpha will work out the best route and the control room staff will be able to feed this information into the main system to override the normal control during the emergency. The third Alpha is being used for program development and the establishment of a database.

Wang names Dublin firm as distributor

FOUNDED two years ago to provide support for the Singer Business Machines base in the Irish Republic, Control Systems Ltd of Dublin has now been appointed Irish distributor for the Wang line of small systems.

Spearheading the market attack is the Wang 2200 desk-top display computer, which has already scored sales of over 6,000 in the rest of the EEC.

Programmed in extended Basic, the 2200 is offered with over 30 different peripheral attachments, and is being aimed at both the laboratory and small business markets in Ireland.

Special Offer by COMPUTER WEEKLY

A new and absorbing game with special interest to computer personnel

'OTHELLO'

SAVE 75p

the game you will never want to stop playing!

OTHELLO is a game of strategy for two players. It is played with two-sided, black and white counters on a squared board. At each move you capture one or more rows of your opponent's pieces by trapping them between your own pieces. The captured pieces are turned over to show your colour. The process switches back and forth throughout the game, and part of the appeal is the potential for dramatic reversals right up to the last move of the game.

● Take advantage of Computer Weekly's special OTHELLO offer and you will get a chance to join the British Othello Federation and take part in next year's British Championship. The prize is a place in the World Championship in Hawaii.

Take advantage of this offer through Computer Weekly OTHELLO £3.75 ONLY

NORMAL REC. PRICE £4.50

or £2.99 if you call in and pick it up yourself from the DAVID HANN Organisation Tel: 01-390 2606

Please send me sets of OTHELLO at £3.75 per set. I enclose a cheque/postal order for £ made payable to THE DAVID HANN ORGANISATION.

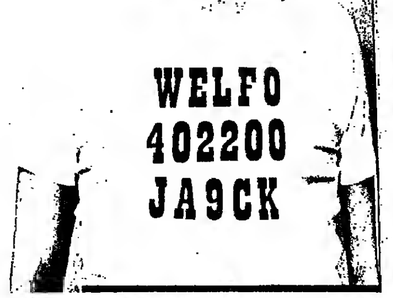
Send this coupon and your payment to Computer Weekly Othello Offer, The David Hann Organisation, 7 Brighton Road, Surbiton, Surrey, KT6 5LX. Use block capitals — this coupon will be your address label.

NAME

ADDRESS

Data privacy for Everyman

How to avoid the second half of the trip to 1984



By WELFO 402200 JA9CK

With the increasing amount of data being held by government databases, John Welford (above, right) believes that the time is now ripe for a change in this policy. He points to the "universal alias" available from the Swansea licensing centre and copied on to the National Police Computer.

In the interests of personal privacy he asks that this dangerous precedent be reversed; and is convinced that privacy systems must be designed on a basis of "minimal trust" if the journey along the road to 1984 is to be halted.

Welford — alias WELFO 402200 JA9CK — is a postgraduate research student at the Open University and is an SSRC Research Fellow. Based in Musselburgh, near Edinburgh, he is currently researching nominal record linkage for his PhD. This will involve setting up a population database run under IDMS on an ICL 2980.

THE fact that my car registration details are held on a computer in Swansea causes me little concern. The fact that these details have been copied to the National Police Computer at Hendon I find extremely disquieting.

"Half-way to 1984" was the title of a recent BBC "Horizon" programme concerned with computer based information systems, and this perhaps sums up the anxiety of many towards the privacy problem. Thus, the concern is not with illegal access as such, but with the potential misuse of centralised personal information by the State. And the wholesale gathering of information by the police confirms the fear that we are moving towards what has been called "a policeman's dream, but a citizen's nightmare."

How then do we devise privacy systems which resist intrusion from the criminal and the State? I believe that it will need a prior reassessment — both of our methods of identifying people and of our techniques for organising personal information.

First let us look at the problems of data privacy.

A systems designer concerned with computer privacy faces two problems.

- How to ensure that personal information is accessible only to those who should have access to it.
- How to organise individual files of personal information so that cross-linkage and the production of life history dossiers will not be possible at a future date.

One way to keep something private is to build a stout wall around it, and solutions based on this idea are widely employed. Restricted access to media libraries, system privilege controls, the use of passwords — all are intended to isolate people from certain areas of the system.

But will such techniques give us data privacy? Probably not. Our stout wall may keep out potential intruders, but it will be less successful against those within the wall — operators, systems designers, installation managers, etc. More significantly, the stout wall offers no protection against a "progressive," corrupt or dictatorial government. Without warning a law could be changed, protective walls removed, and everyone's personal privacy immediately destroyed. Reliance on such techniques is therefore foolhardy.

An alternative approach involves disguising information, for example by scrambling or encryption. Unfortunately this is no better. Scrambling codes and encryption algorithms can be broken. Furthermore, a government body wanting access to an encrypted file would doubtless possess a decoder, so again privacy would be destroyed.

Clearly, data privacy is profoundly difficult to achieve. To solve the second problem, the avoidance of potential cross-linkage, we must first consider the nature of personal identification.

The name that we receive at birth serves moderately well as a personal identifier. Unfortunately, for some purposes this name has a weakness, it is usually not unique.

A common solution is the unique identification number. Thus, a previous employer identified me as "671722WEL." The six numeric digits served as my unique identifier, with the first three characters of my surname used as check digits.

The advantages of this scheme are obvious: it avoids confusing one person with another, and ensures that an individual's records (personnel, payroll, etc) are correctly associated with him.

Each such unique identifier is effectively an "alias," and we now normally possess several of these. For example, the Open University has given me the alias "HDC 7125," while the Post Office appears to use a concatenation of my telephone number and the first three consonants of my surname.

To return to the problem of potential cross-linkage. Suppose that we set out to create life history dossiers using records from independent files, we would quickly discover that efficient linkage was possible only if we could find out how a person was identified in each file; ie, if we could discover his aliases.

This has enormous significance for data privacy. Firstly, the more aliases we have the more difficult it will be to cross-link. Secondly, and conversely, replacing our present multiple-alias scheme by one employing a single "universal" alias would be fatal for privacy.

Despite our understandable aversion to universal aliases it seems that they are already in use in this country. Observe the alias in Fig 1: this was created by the Department of the Environment, and it appears as the "driver number" on my current driving licence.

This alias is unlike those already cited — they merely distinguished me from other members of some subgroup of the population, eg, those working for a particular employer. The "driver number" alias, however, can distinguish me from everyone else in the UK: it can therefore be used as my universal alias.

Consider the structure of this alias: The first field contains the first five characters of my surname. The second field contains, in disguised form, my date of birth and sex, the first and last digits indicating year ('40), and the middle digits giving month (02) and day (20). The sex is indicated for female by adding 50 to the month value. The third field starts with my initials, followed by three somewhat obscure characters. It seems probable, however, that the number provides additional discrimination and that the final characters are check digits.

WELFO	402200	JA9CK

Fig 1. A universal alias.

To test the discriminating power of the scheme, I investigated the uniqueness of my own alias using birth register indexes in London and Edinburgh. For births during the first quarter of 1940, I found no name that would clash with mine in the generation of aliases. There was another John Welford born in the period, but he had only one initial. My universal alias therefore seems "safely" unique.

Obviously, more popular surnames may introduce clashes. However, the middle digit in the final field of the alias can be used to distinguish people with matching surnames, initials, and sex who were born on the same day.

What may we conclude? It is clear that the Department of the Environment, albeit unwittingly, has created an effective universal alias scheme. In the interests of personal privacy, therefore, it is imperative that this dangerous precedent be reversed.

Before considering the design of a system with acceptable data privacy, let us recall the intrinsic weaknesses of the approaches discussed earlier, ie, the use of "stout walls" and disguised information. Quite simply, they provide no protection against government intrusion and only limited protection against those running the system.

Overcoming such fundamental weaknesses will clearly need a radically different approach.

Let us analyse our dilemma. We have saddled ourselves with privacy problems largely through our determination to centralise machine-readable information. And the anxiety about the setting up of life history dossiers seems to rest precisely on the fear that independent databases will be merged into larger databases. Our overriding problem is the uncontrolled and uncontrollable aggregation of information.

I propose, therefore, that the remedy lies in the deliberate disaggregation of information.

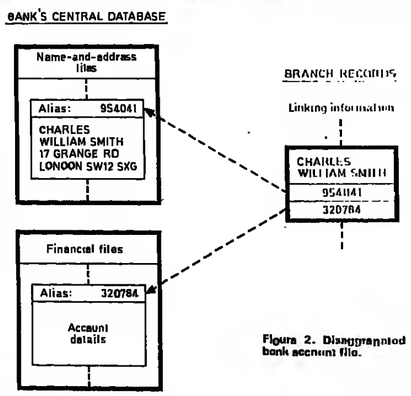


Figure 2. Disaggregated bank account file.

Not that we should take a Luddite hammer and break up our databases. Rather, that we should restructure our information into a disaggregated form. By doing this intelligently we could ensure that it was not amenable to intrusion or cross-linkage.

As a simple example, consider the customer accounts stored on a bank's computer. Each account may be regarded as a personal file requiring privacy. To achieve this we take each such file and divide it into two files, placing all financial information into one and identifying information; name, address, etc, into the other. Anyone gaining access therefore sees thousands of files containing financial information and thousands of files containing names and addresses, but has no direct means of locating a particular customer's account.

Clearly, it is occasionally necessary to associate each pair of files, for example, when statements are required. To achieve this we give each branch customer two aliases, one identifying his financial file and the other identifying his name and address file. The mapping between the customer and his aliases, therefore, provides the linking information needed to associate his two files. Such information is held privately by the staff employed there. This organisation is illustrated in Figure 2.

The advantage of this approach is that responsibility for privacy is subdivided and dispersed in the bank's branch employees, the systems staff at the central computer now having negligible potential for intrusion. As for the central computer, its role is transformed from omniscient "master" to overgrown filing clerk!

Consider how complex it would now be to break the privacy of the bank's files. In particular, it would require the acquiescence of many bank employees, so it could not be done easily "behind people's backs." The logistics would also be complex, requiring the aggregation of information from separate locations. We can reasonably conclude therefore that if all personal files were disaggregated then nobody, be he criminal, policeman or dictator, could surreptitiously invade our privacy.

Another advantage of disaggregation concerns freedom of access to information. Data privacy techniques normally reduce access, thereby causing under-utilisation of a potentially valuable resource.

Sustained analysis of personal medical files could probably lead to a transformation in the standard of our health services. Unfortunately, since their contents are often highly sensitive, privacy infringement could be damaging for the individual. However, by disaggregating each file and skimming off the crucial identifying information, we could simultaneously achieve our two objectives — acceptable privacy and optimum use of medical data.

Since aliases play a crucial role in the scheme we must think carefully about their construction. Consider the alias for the customer's financial file. Since this alias appears in the financial file it should obviously not contain information which would identify the customer. Ideally it should take a random allocated value. The "data number" alias is, at the other extreme, an alias which contains information which can be decoded and used for precise identification. It would clearly therefore, be unsuitable.

We must finally consider how practicable it would be to maintain personal information in a disaggregated state and ask whether appropriate hardware exists.

This approach obviously requires a dispersal of "intelligence" away from the central computer. Happily, developments in distributed processing are making available what is needed. Thus, a central mainframe connected to intelligent terminals provides a hardware organisation admirably suited to the proposed scheme.

The terminals could supervise the handling of aliases and so provide convenient operation. However, their storage capability gives an additional advantage: we can now take disaggregated personal files and disperse them geographically. Identifying information could be stored at the terminals, with the remainder held at the mainframe. By extending the principle of disaggregation we could therefore gain even greater privacy.

To return, finally, to the concern expressed at the start towards the transference of personal information to the National Police Computer. My policy is manifestly incompatible with a file disaggregated approach to data privacy, and rests, I believe, on an inadequate and totally naive assessment of the potential dangers.

I am convinced that we must design our privacy systems on a "minimal trust" principle — assuming that people are not to be trusted, rather than the reverse. If we can apply the principle consistently and thoroughly, then who knows, we may yet avoid the second half of the journey towards 1984.

Design system speeds Glasgow rebuilding plan

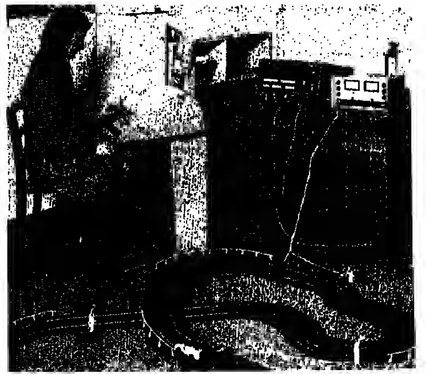
THE computer aided architectural and landscape design system developed at Edinburgh University (CW, November 20, 1974) has found practical use at the government-funded Scottish Special Housing Association, one of Scotland's biggest house building organisations and landlords.

One of its early jobs will be helping to redesign the east end of Glasgow, which is being rebuilt in a £120 million slum clearance project.

The Scottish Special Housing Association now has its own Digital Equipment DECsystem-10 for running the system and expects it to be used as a matter of routine in all its projects by the end of the year.

Hunter Cairns, assistant principal architect at the association, said it normally took up to eight weeks to design a house and another month to work out costs. Using the system the entire process was completed in a week.

The system has already been used to design 80 houses in Saltcoats, West Lothian, and 100 houses and flats in Clydebank. The clearance of Glasgow's slums will involve designing factories and workshops, a riverside walkway and accommodation for 50,000 people.



Schoolboys of all ages would have been fascinated by this demonstration of microprocessor-controlled Scalextric motor racing, one of the star attractions of an open day and charity fair held by the W. S. Atkins Group at its Epsom offices.

Atkins' Systems Engineering Department set up the demonstration and used an Intel 8080 based Intelec 8 microcomputer linked to 14 sensors on the 30 foot track to control one of the two cars. Its competitor remained in the hands of a human driver with a hand-held throttle.

Atkins explained that the sensors were distributed around the circuit to pinpoint accurately critical areas, such as bends and inclines, and that systems testing enabled estimates of speeds to be refined and optimised so that the car would run at nearly the maximum speed possible consistent with staying on the track — popularly known as dicing with death.

But Atkins sees its hardware/software package being used for more than fun and games. The company points out that the same software can handle any similar type of application such as a conveyor belt controlling the flow of materials on a production line.

Mini helps to detect cancer

COMPUTER analysis of infrared scanner data by a Honeywell Level 6 mini is helping to detect breast cancer.

A two-year study in the US sponsored by the National Cancer Institute, is being carried out by researchers at the University of Oklahoma Health Sciences Centre. Potential radiation hazards are eliminated by the use of infra-red techniques, enabling a thermal "picture" to be built up.

The thermal charting is recorded on magnetic tape in the form of temperature readings of 1/100 sq inch skin areas.

By analysing these temperature differences, diagnosis of a number of conditions can be made, including cancer.

The scanner technique has been developed from earlier Honeywell programs for aerial infra-red monitoring for crop disease or geographical feature checking.

Survey of IBM users

A SURVEY of IBM users is being made by the users' association to pinpoint possible areas of improvement in support. The survey is the second carried out by the association in three years.

"Members have different views about whether there have been any improvements since the last survey," said an association spokesman. "The survey will give a more precise picture of any changes."

The 660 members will receive a questionnaire covering such matters as engineer response times and hardware reliability.

The results, expected in January, will be discussed with IBM.

Xerox Corp to acquire Shugart

LEADING independent manufacturer of floppy disc drives, Shugart Associates, is being acquired by the Xerox Corp. Shugart says that a letter of intent just signed with Xerox should lead to a final agreement before the end of the year. Under this Shugart will operate as an autonomous subsidiary of Xerox with its existing management and international distributor network.

Shugart, founded in 1973, is based at San Jose, California and had a turnover of $18 million in its financial year ended April 30.

Motorway meeting

FOLLOWING the British Computer Society's offer to evaluate the computer controlled motorway signalling system, Dick Waller, chairman of the BCS Privacy and Public Welfare committee, has had an initial meeting with the Traffic Control Department of the Department of the Environment.

A controversy started after a fatal accident on the M4, but a police inquiry had since indicated that the accident happened before any computer or operator action had become necessary.

MPs take to task government board

THE criteria employed by government bodies to assess the technical and economic feasibility of new technological developments has been called into question by the Commons Select Committee on Science and Technology.

The doubts have been expressed in a report* from the Committee, which is the result of a study of one particular development in the high precision machine tool industry.

In this instance, the government body was the Mechanical Engineering and Machine Tools Requirements Board of the Department of Industry, which has responsibility for approving government finance for machine tool projects.

The project in question was a gear grinding machine that employed a computer-controlled gearbox system to produce an operating accuracy 10 times greater than previously available. The machine had been designed by Matrix Machine Tools and the Cranfield Unit for Precision Engineering, part of the Cranfield Institute of Technology, and had an additional interested parties, Westland Helicopters and Rolls Royce.

Key to the committee's criticisms of the Requirements Board rests with the latter's desire for short-to-medium term results, especially in sales and financial returns. In addition, the requirement for a minimum 50% financial commitment by the industrial company concerned "failed to reflect a proper understanding of the current financial problems facing the machine tool industry."

The board was also taken to task, as was Matrix, for not seeking more evidence on the equipment's market potential. The original Matrix market survey was based on historical trends in the industry, and not on the potential market for an entirely new machine.

* Second Report from the Select Committee on Science and Technology. A case study of a machine tool development at the Cranfield Institute of Technology (HMSO £3.80).

US firm gets big PO order

● From front page

given the opportunity to make a second bid before the award went to the US company.

The company believes that the Department of Industry would be the appropriate body to investigate the order. The department says it has received a letter from Case but has not yet decided what action to take, if any.

The Case 670 multiplexer is used by the French PTT both for a service similar to Dataplex and in the planned Transpac packet-switched network. Case is also on the brink of winning the £65,000 multiplexer contract for the EEC's planned Euronet packet-switched network.

Case's new generation of multiplexers, due out in about a year, was heavily supported with money from the Department of Industry, with the Post Office acting as technical consultants.

"There could be no better way of demonstrating the confused state of public policy on the UK computer and communications industries," said Peter Burton, Case's other managing director.

"On the one hand, the government is helping Case consolidate its position as the only European manufacturer and UK market leader in multiplexers, while on the other hand, a large public corporation wants to give support and encouragement to a hitherto almost unknown foreign competitor. You can't get much more crazy than that!"

Infotron's European distributor is to be Infotron Systems of Dorchester, Dorset in which the US company has a large minority stake. The company said that the Timeline 780 devices, which are to be supplied under the contract, will be 60% manufactured in the UK.

In aid of disabled and blind computer staff

COMPUTER WEEKLY'S Annual Charity Ball

The industry's big night out

Computer Weekly is holding its second Charity Ball. Last year we celebrated our tenth anniversary, this year we are just celebrating. Come and join in the big night out for the computer industry and help us raise funds for the MATE project. Proceeds from the Ball are to be donated to the British Computer Society Specialist Group for the Disabled to aid the development of MATE II, a memory-assisted keyboard terminal designed for use by disabled and blind people. The Ball is being held under the patronage of the BCS and we invite all our readers to support this very worthwhile cause and at the same time enjoy a pleasant evening with friends and colleagues.

Tickets are £12 each and include dinner, cabaret and dancing until 2 am

Tables for parties of 10 can be reserved on request

Friday October 14 at the Royal Lancaster

Order Form **COMPUTER WEEKLY Charity Ball**

Tickets are available at £12 for a single ticket. Included in the price is a dinner, cabaret and dancing until 2 am.

Please send me ☐ single tickets at £12 per head (enter number required)

Please reserve . . . table(s) for me (10 places at £12 per head)

My cheque for £ . . . . . is attached (cheques should be made payable to IPC Business Press)

When completed this order form should be returned together with your cheque to Tony Higgins, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU.

Please send the tickets to me at the following address:

Name . . . . . .

Company . . . . . .

Address . . . . . .

BOOKS

Guide to better standard setting

Systems and programming standards, by Susan Wooldridge. 189pp. £10.50. Petrocelli/Charter Computer Science Series, distributed in the UK by Input Two-Nine.

THIS book is intended to help the data processing practitioner to introduce, or improve, the standards used in his department. The author is a lecturer and her book reads as if intended as a series of lectures.

An artificial distinction is drawn between "operating standards" (described as production oriented) and "development standards," which in the reviewer's opinion also ought to be production oriented. The only mention of "project control standards" (including documentation and progress reporting) is a suggestion, towards the end of the book, that standards ought to be used. The absence of discussion of these standards is an omission which the author has probably covered in her other book, Project Management in Data Processing.

The book does not impose standards, but indicates where standards are needed. Unfortunately it mentions some areas where standards are needed without discussing guidelines for developing them.

Miss Wooldridge has devised 10 basic chart symbols for analysing work flow, "which analysts can add to as the occasion arises." The flowchart which illustrates the use of her symbols contains a major error which might not have occurred if she had used the five conventional symbols for work study diagrams.

An omission is the document flow cross-reference chart, which reduces a three-dimensional problem to a two-dimensional analysis. As a result of these faults, the section on data and problem analysis is the weakest in an otherwise excellent book.

The book suggests that job descriptions might be included as appendices to standards manuals, without discussing the standards required for them or the related topics of "terms of reference" and "department structures." Treatment in greater depth would also have been desirable in the sections on use of glossaries; user department system tests (which appear undervalued); checking standards are complied with.

A standards manual should not be allowed to become a textbook. For training staff a separate text with examples and exercises should be available. This is underemphasised.

The reminder of the book, devoted to standards for development and implementation of systems and programs, provides excellent coverage of installation requirements. The book is an essential reference work for managers and consultants concerned with the introduction of standards.

J. W. MITCHELL

Browser's pleasure

The compleat computer, edited by D. Van Tassell. 214pp, plus index. £3.55. Science Research Associates, Chicago.

THE full title continues, "being a compendium of Tales of the Marvellous, poetry, informative news items, articles for edification and enjoyment, cartoons plus many other illustrations — with a splendiferous section of science fiction art in full colour." Perhaps this is not a book to read, but rather one to own and browse through for sheer pleasure.

It comprises about 100 reprints, sometimes somewhat curtailed reprints, of articles ranging from the history of computing, applications, governmental usage (including key areas of privacy and security), software and so on right through to some fairly sensible predictions for the future, including the sociological implications.

It manages to do this entertainingly both for the computer practitioner and the noncomputer specialist. Indeed the editor has largely succeeded in showing how non-computer specialists think about computers. This is achieved by an excellent selection of science fiction articles, cartoons, advertisements and even poetry ranging from Auden's disquieting The Unknown Citizen right down to the refreshing Programmer's Lament:

I really hate this damned machine,
I wish that they would sell it.
It never does quite what I want,
But only what I tell it.

The book is divided into the different aspects of computing, each chapter having a useful set of references for the serious student who want to pursue a particular topic further, plus a series of questions and suggested projects to get the lay reader thinking. Within each of the nine chapters, the essays and lecture addresses are set out in a lively way.

My newly appointed but already long suffering secretary also enjoyed the book, commenting only that perhaps the computer specialist's appreciation of what the non-computer person thinks about computers is itself suspect — for example, is the public image of the computer indeed that of "an infallible machine?" However, this element of controversy was part of the book's fascination for both of us. It is one of the most amusing non-fiction books I have read for a long time, to be recommended to anyone wanting to know more about the mystique surrounding our industry, or to the diehard professional learning to express complex concepts in an easy to understand style.

STEVE SHIRLEY

Program design for software specialists

Program design methods — working papers, by G. B. Bleazard. 104pp. £2.50. National Computing Centre.

THE short collection of working papers contained in this volume is intended primarily for NCC members, and in particular for management and senior personnel in commercial programming. This is unfortunate, since the material it contains is worthy of distribution to a much wider audience.

Indeed, it would probably make enjoyable reading for all established programmers and software engineers, and would form an informative source book for those who are new to the software development profession and who are in search of some sound principles and guidelines from which to build a healthy design methodology.

The objectives of the book are twofold: firstly, to review those approaches and principles which are currently available for the design of software and, secondly, to attempt to explain and clarify the meaning and significance of the large number of new words, expressions and acronyms that constitutes the newer terminology in vogue within computing circles — for example, HIPO, Program Network Diagrams, Connectivity Matrices, Structured Walk-throughs, IPT etc.

The text has a broad coverage, and a large number of concepts and techniques are reviewed. Most of the topics are not taken to a detailed level, as the reader is able to investigate further the details of particular topics via the extensive bibliography (87 references). This collection of references contains pointers to the most important primary sources of information in this area; for example, the work of Dijkstra, Mills, Wirth, Parnas, Jackson and many others.

Essentially, the material contained in the book is sub-divided into 13 mini-chapters. The first five contain mainly background material designed to prepare the way for the contents of the seven sections which follow. These latter sections cover the objectives of program design, design principles and the implications of design methods for program coding and for the organisation of development. The final sections are devoted to a description of some of the new types of documentation techniques which are currently in use, the application of special purpose program design languages and their possible use in conjunction with computer-based design systems.

The book is well-written and has a pleasant, easily digestible style. Even the half-dozen printing errors that it contains do not significantly reduce the standard of presentation. To reiterate my opening remarks, the text should be made recommended reading for all established and trainee software engineers.

P. G. BARKER

Comprehensive work on Cobol

Advanced ANS Cobol with structured programming, by Gary D. Brown. 512 pp. £13.50. Wiley-Interscience.

AS the title suggests, the author has packed a lot of information into this book. It includes a comprehensive description of ANS 74 Cobol, good programming practice in Cobol, IBM 370 OS Cobol and how to use it.

The book is not really intended for beginners, but does describe all the features of ANS Cobol from MOVE and ADD all the way through to the Report Writer and the Communications facility.

For users of the IBM 370 under OS, all the variations from the 1974 Standard are highlighted and the extensions described. Information about the Job Control Language, the system software and file formats are also included to provide sufficient information to compile, link-edit and run Cobol programs on the 370.

Three chapters are devoted to programming techniques. Guidelines for producing good programs are given, with special emphasis being placed on structured programming and its use in Cobol. The structured programming techniques discussed are those advocated by IBM and Dijkstra (not the Michael Jackson variety), although the author recommends a more flexible approach than some of the more rigid practitioners would permit.

Thus the book contains a large amount of useful information, and it is presented in a clear and readable manner. Anyone with some knowledge of Cobol who is interested in learning more about structured programming in Cobol, or ANS 74 Cobol or IBM 370 Cobol, is likely to find parts of the book useful. The outward-looking nature of the book in presenting the current standard and a major implementation is praiseworthy. But it would be wasted on any programmer who has no desire to be, or has any intention of being, outward-looking.

The book is most likely to be of use to the programmer who needs to know about more than one implementation. Such programmers will include students (if they can afford £13.50 for the book) on certain courses, and programmers who are concerned with portability between IBM 370 and compilers based on ANS 74.

J. M. TRIANCE

The everyday machine

The computer — and everyday machine, by Enid Squire. 186 pp. £7.20. Addison-Wesley.

THIS is an excellent introductory textbook on computers, intended for management training courses. Since 1972, when the first edition appeared, there have been considerable technical developments which are introduced in this edition, including such topics as databases, virtual storage, structured programming, communications devices, mass storage devices, privacy and security. The subject matter reflects the author's background as an IBM employee.

The principal criticism of the book is that it is not suitable for isolated reading, but only for use as the core of an organised course of tuition. This is a pity, because with slight modification it would be a valuable introduction to computing for home reading by potential users.

The 19 chapters cover various aspects of computing in a fairly logical sequence. Each chapter concludes with a series of review points, and problems or projects for the student to complete. No model answers are provided to enable the home student to monitor progress, a gap which the course tutor must fill.

Furthermore, many of the problems require additional research to provide a reasoned answer: yet there is no suggested bibliography to which the student can turn.

As is inevitable, there are some controversial opinions expressed and some interesting non-sequiturs. Incomplete lists of buzzwords are provided and not all the terms used are covered in the glossary. In places the editing is poor; in particular the section on structured programming should be restructured. This is surprising, as it appears that the book was prepared using word processing equipment and computerised typesetting. The author also tends to stress the advantages of items discussed, and ignores the disadvantages, thus turning what should be an unbiased guide into a sales document.

The inevitable hypothetical machine and codes are used for illustration of machine and assembler level languages. One wonders why an actual machine language could not have been used in each case, particularly as both Fortran and PL/I are used as examples of high-level languages. On an ideal course one would expect a genuine language to be used, thus enabling the solutions to student problems to be processed.

The chapter on Fortran and PL/I briefly describes only a few features of the languages, making Fortran appear far simpler than it is and PL/I extremely complex by comparison. To cover both languages in this way is bound to confuse the newcomer; it would be preferable to cover one language in greater depth. Obviously in this area there is scope for a course tutor to develop additional work.

More guidance should be included on methods of analysis and problem solving. This could encompass the section on structured programming, which has been included in the chapter on the use of the computer for problem solving and education.

JOHN W. MITCHELL

Fundamentals for the degree student

Digital computer fundamentals, by Thomas C. Bartree. 544pp. £11.20. McGraw-Hill.

THIS book lives up to its title; the operation and design of computers are thoroughly covered, and any necessary theory is given. Its main appeal will be to the student, for whom many examples and some selected answers are provided. Subjects are covered at a level which should ensure that the computer science or data processing degree student has all the information he needs. However, the systems analyst or programmer in the field will find a great deal of interest here, but little that is vital.

Number systems are covered in detail, with conversions and representation in binary, decimal, BCD, octal and hexadecimal. The basic theorems of Boolean algebra are given, and the principles of gating lead on to the design of more complex arrangements. Flip-flops, transfers, clocks and their functions, shift registers, binary counters and integrated circuits are covered under the heading of logical design. Digital circuits are discussed, and the functions of semiconductors, AND and OR gates, Schottky diodes, MOS and CMOS circuitry are explained.

The operation of the arithmetic-logical unit and the control unit of computers are thoroughly discussed, with a chapter devoted to each. The basic units of memory — magnetic cores, semiconductors, etc — are described, and their aggregation into various units to form memory systems is considered in terms of cost and effectiveness.

In all these areas the book makes a real contribution to the information available to the student. Only the introduction strikes a false note, in that there is an attempt to introduce a specific language, PL/I, in the space of four pages. This is not really possible, and it would be better to leave language descriptions at the definitions stage.

This book brings together a good deal of useful information for the degree candidate, and will also provide a reference for BCS, HNC and HND students at a level higher than they would normally require.

OWEN HANSON

Towards reliable DP

Data engineering, by Tom Gilb. 208pp. £8.50. Input Two-Nine.

WHAT is data engineering? According to the author, engineering implies a systematic collection of alternative techniques described objectively and quantitatively. So a reader might expect chapters on the design of data storage at item, record, file and database levels, and presentation of data for input and output. Such a reader would be disappointed.

The author admits in his preface that the title was originally "Reliable EDP;" the new title is somewhat pretentious, and the text is not complete.

Most of the book is concerned with error analysis, motivational techniques for reliability and message design. The author is clearly more interested in new ideas than in the collation and description of existing techniques.

If you take the following sample of propositions to be self-evident, don't bother to read the book. If like me, you find some of them novel or surprising, then the book is worth reading.

- Program testing can never show the absence of bugs.
- It is not possible to reduce the number of bugs in a program — we can only move them to different locations in the logic.
- Programmers with the same background may vary by a factor of 25 (twenty-five) in the time taken to code and test programs.
- It can be worthwhile deliberately to add bugs to a program under test.
- For a high quality program, productivity is improved by writing the program twice.
- Computer systems should not merely detect human errors. They should try and correct them even if it involves guessing.
- Value range limits of data items should be adjusted automatically by the program.
- Critical data items should be placed in the middle of records — it is safer there.

The material is well presented, with straightforward, readable text, diagrams and a good number of practical examples.

P. A. REAVLEY

Appointments

LONDON — Derek Blakemore — 01-261 8454
MANCHESTER — Owen Kelly — 061-872 4211
BIRMINGHAM — Alan Escott — 021-356 4838
GLASGOW — Owen Kelly — 081-872 4211
BRISTOL — Alan Escott — 021-356 4838
LONDON — Steven Bassinghwaite — 01-261 8174
MICHAEL WHITE — Classified Advertisement Manager — 01-261 8028/8658

What about the engineer?

By Bernard Wood

With the expected growth in computer installations, there will be a corresponding need for engineers to maintain them. Bernard Wood, Computer Technology's training manager, suggests a survey of the industry's needs and resources is required.

IT has been estimated that the growth in value of new computer equipment installed in the UK will rise from over £700 million now to nearly £1,000 million in 1980, assuming a 10% growth. This equipment will need maintenance engineers to look after it. How many will be needed, and will there be enough to meet the demand?

We can make an estimate of the number of engineers required by assuming that, on average, one engineer can look after, say, £300,000 worth of equipment. The number of new engineers required each year on that basis will grow from around 2,500 to 3,200 in 1980. Even if one engineer could look after twice as much equipment as we have assumed, the demand would still be considerable.

Support for the above sales figure comes from a Financial Times Survey (November 19, 1976) which estimates £4 billion sales of computer peripheral equipment in Europe in 1980, with peripherals defined "in the widest sense of the word, from simple communications units to intelligent units with a great deal of autonomy".

So what can we conclude from this? Although forecast figures for numbers of data processing staff are freely available and are the subject of concern, as far as it is known the engineer is almost entirely neglected. Inquiries to bodies which might have been expected to have an interest, usually elicit mild surprise.

It seems, therefore, that apart from the estimates quoted above, we do not know enough about (a) the future trends in an engineer's job, (b) the training required, and (c) whether traditional sources of supply of engineers will be sufficient. A survey is therefore required. What precisely should such a survey attempt to discover?

Rapid changes in technology require urgent consideration of what the future engineer's job will be like. Large scale integration of logic circuits means less and less concern with components and individual gates. Will the job then be reduced to board changing? Computers with the ability to carry out self-diagnosis are available. Where does this leave the engineer?

On the other hand, systems are becoming more complex and unless the engineer has the ability to think in terms of systems, he will have difficulty in locating the module upon which to do his board-changing.

Then there is software. The distinction between hardware and software is becoming more and more unhelpful as systems design relies increasingly on trade-offs between the two.

As a result of this, the engineer may encounter different proportions of hardware and software in different systems designed to solve essentially the same problem. This being so, it would seem to indicate a requirement for a wider range of skills to be developed in engineers, both for the benefit of the customers they are serving and for their own career development. We need more information on all these questions and, in addition, we need to know to what extent the industry will require all engineers to be broadly based and to what extent it expects to employ a range of specialists from, say, those competent to deal with the simpler electro-mechanical devices only, to fully fledged systems engineers.

The majority of engineers are employed by computer manufacturers and independent service organisations and allocated to customers either as residents on larger sites or as roving engineers between a number of installations. Some consider that a different type of person is required for each of these two methods. Apart from computer manufacturers, large users of computers may themselves employ an engineer who will then almost certainly be residential.

Recruitment policy varies considerably: some will aim to recruit specialists; some will want all-rounders; some hope to recruit experienced people who will need only a small amount of conversion training on the particular equipment involved; others prefer to take on more junior staff and put them through a comprehensive training scheme — in other words to "grow their own engineers".

Existing sources include experienced computer engineers wishing to change their jobs; promotion of juniors or widening the scope of a specialist; those in allied occupations such as TV and particularly those with relevant experience in the Armed Forces, who are often valued as being mature and responsible.

There are also independent training schemes for engineers, eg those under the government's TOPS scheme offered by CTL and CDI, which aim to feed the market requirements by comprehensive training of engineers starting at various levels, from those with electronics experience to those with no relevant experience at all.

Are all these sources of engineers going to be sufficient in numbers and quality to meet the demand? Clearly, if the total demand for engineers is increasing, interchange between employers cannot provide enough, and it is doubtful whether direct recruitment from allied civilian trades such as TV can be fully satisfactory without more attention being given to training.

The figures quoted, interviews with some employers, and the interest of employers in independent courses suggest a prima facie case for more and better training. But in order to relate this more closely to needs, much more information is required. A survey on the following lines would be worthwhile.

It could usefully cover computer manufacturers, manufacturers of equipment which does not at first sight incorporate computers (eg medical equipment), microcomputer manufacturers, independent maintenance organisations and those users who employ engineers themselves.

Questions could include basic facts: equipment concerned, size and structure of maintenance organisation, amount of equipment serviced by one engineer; numbers and types of engineer needed now or in the future (eg all-rounders and/or specialists); present recruiting sources and methods; ideal candidates — what training and experience they should have; maintenance philosophy, eg board changing or otherwise; attitude to software and other topics not traditionally associated with engineering; what training, if any, is required for engineers as representatives of their employers.

Several bodies, including the NCC, NEDC and BCS have committees considering personnel requirements in the computer industry. It would seem appropriate for impartial bodies such as these to consider the requirements for engineers as well.

Datasolve Datasolve Datasolve

Knight CONTRACTS

Operators

Whether you are looking for contracts here or abroad and have 2+ years experience, our co-ordinators are always willing to advise. For further details on these and forthcoming contracts call Pat Eagling or June Mogg **NOW** on 01-491 4706.

IBM VM 370 Ops-KENT - Top Rates.
ICL GEORGE II Ops-HULL, LEEDS and SURREY.
ICL SYS 4 and 2900 Ops-UK.
Data Control Ops-LONDON & SURREY.
ICL GEORGE III Shift Leader-KENT.
Terminal Ops-LONDON.

IN EUROPE
IBM OS JCL WRITERS required for long term Luxembourg contract to commence in September. Three Levels of French acceptable, fluent, good French and working knowledge. Excellent salary + bonus and other perks.

Call Pat Eagling or June Mogg on 01-491 4706 NOW.

Programmers

LONDON
ICL 1903 George II Cobol (North London).
PDP11 RSX11/Macro 11 (Central)
IBM 370/158 OS/VS PL1 (West)
ICL 1900 George 11 Cobol Analysts and Programmers UNIVAC EXEC B Cobol Programmer (West)

RPG II Programmer/ Analysts. TOP RATES -All machines.

GUILDFORD
IBM 370 COBOL
VENTEK/DATASHARE Programmers

GENEVA OR SOUTH COAST
IBM 370 OS PL1 Programmers

For fuller details of contracts in Britain or Abroad don't hesitate to call Richard, Mike or Sue on 01-491 4706.

Knight RECRUITMENT

SHIFT LEADER – £3,700 Neg.
Our client, situated in EAST LONDON, is looking for someone in their early twenties with at least 18 months DOS or DOS/VS experience to be shift leader on an IBM 370/125. So if you are seeking opportunities and increased responsibility, please call us for more details.

GOOD OPERATOR – £3,800
Want to work in TRENDY HARROW? This is a golden opportunity for a good operator with large IBM experience under DOS VS and POWER. Our client runs a 2 shift system and offer good promotion prospects, good salary and, openings into programming.

ICL OPERATOR TO £3,900
Our client in the SUNBURY AREA is looking for an operator with 18 months 1900 or 2900 experience to operate their 2903. This is a fast expanding installation running a 3 shift system, and offering excellent promotion prospect.

For the best permanent operating vacancies ring Andy Mogg in London.

For the best opportunities in the Midlands ring Ray Parsons.

BIRMINGHAM
Senior and Junior Programmers up to £5,000.
Thriving software house to mini-manufacturers require programmers with one to two year's ASSEMBLER experience. Applicants must be smart in appearance and prepared to work closely with clients.

NOTTINGHAM
Analyst/Programmers to £4,500.
Analyst/Programmers with a minimum of 2 year's ICL COBOL experience and at least 6 months systems experience to join a small progressive team. A working knowledge of PLAN and ON LINE systems would be and advantage.

WEST MIDLANDS
Systems Programmer Salary negotiable.
2 year's systems programming experience on IBM main frame or university graduates willing to undergo training. ASSEMBLER language experience an advantage.

BIRMINGHAM
Programmers/Senior Programmers , £5,000+.
Good knowledge of ICL COBOL is essential to join a team of programmers working on commercial and scientific projects.

Knight Computer Services Limited
14 Old Park Lane, London W1Y 4NL
01-491 4706
24 hour answer 'phone

Knight Computer Services Limited,
Woodlands Road, Birmingham B8 3BD.
021-772 8331
Midlands Recruitment

A member of the BOC Datasolve Group and of the Computing Services Association.

This may be the last coupon you ever fill in!

Name
Address
Tel: home
Tel: work
Area pref.
Number of years' experience in:
Operating | Programming
Analysis | M/C & Lang.
Salary required
PERMANENT | CONTRACT

JBA

Sales Executives

North of Thames — quota £8500 + car

A well established and progressive computer services organisation is expanding its market and requires additional Sales Executives. Candidates must be able to demonstrate a successful track record selling computers or computer services, coupled with an intimate knowledge of the d.p. industry in general. Ideally applicants should have the personality and drive to succeed in a challenging environment.

Salary, commission and fringe benefits are very attractive.

Contact: Jim Baker

Southern Region Support Manager

London — to £6500+car

A progressive and expanding mini computer manufacturer requires an area support specialist to provide liaison and technical aid to a wide ranging customer base. The position calls for the ability to handle large projects, formulate proposals, make technical presentations on the product line and involves all pre/post sales support. Candidates will have a sound and varied commercial/business background coupled with a proven experience of man-management. This is a challenging position requiring a high degree of personal initiative, and in-depth technical knowledge.

Contact: Margaret Stevens

Analyst Programmer

Central London — up to £6000+

A well known merchant bank requires an experienced analyst programmer to assist in developing a new system on an IBM 370/115. This challenging position requires a background in banking, sound COBOL experience, and an analytic mind. Excellent employment package is offered.

Contact: Mike Creamer

Senior Technical Adviser/Team Leader

London — up to £6000 (incl. Bonus)

One of the U.K.'s largest Bureaux has a vacancy for an experienced computer professional to head a new team. Their main role will be in sales support for bureau services based on a 4M Byte 370/168 running MVS and TSO. The successful applicant will be thoroughly familiar with current IBM hardware and software. Ideally the appointee will have had several years experience in relevant areas including programming.

The job offers considerable growth potential. Vacancies also exist for more junior staff, not necessarily with IBM based experience.

Contact: Margaret Stevens

Marketing Support Specialist

West of London — c. £5500+car

Our client, a leading supplier of intelligent terminal equipment seek a sales support person. Applicants must have a background in intelligent terminal and distributed processing applications. Position would perhaps suite a systems programmer from communications environment or a practising sales support engineer.

Contact: Mike Creamer

Computer Engineers

All areas — Negotiable

Our client has an increasing need for local support and field engineers throughout the U.K. Candidates must be practising computer engineers looking for a worthwhile change of employment without necessarily having to relocate.

Contact: Mike Creamer

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES
International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

MYRIAD APPOINTMENTS LIMITED

Computer Personnel Consultants

ANALYST/PROGRAMMERS

ESSEX — £5,000-£5,500

We wish to recruit Analyst/Programmers or Senior Programmers to work in a stimulating environment within the Data Processing Division of a manufacturing company based in Essex.

Candidates for the positions should be able to offer sound experience in either IBM COBOL or Assembler coupled with the ability to function in an analysis role.

The successful applicants will take their places in a small, friendly and active department where they will have the opportunity to work on a variety of interesting projects.

Salaries are negotiable but as a guideline are likely to fall in the above stated range. They are further enhanced by a comprehensive company benefits package.

SHIFT LEADER

C. LONDON — c £4,500

At present you are probably a Shift Leader or Senior Operator, with a sound appreciation of either DOS or OS. If in addition you can demonstrate a flair for a supervisory position you may be invited to lead a shift working on a POWERFUL 370 SERIES machine.

A variety of commercial applications are currently being processed, and you will be encouraged to become involved with all aspects of the work-flow. To that end an appreciation of IBM utilities would be useful.

Opportunities for career advancement are excellent, as you would expect in a major organisation.

If you are enthusiastic and feel that you could contribute significantly within this installation, then the rewards are high. A competitive starting salary being further enhanced by a full range of fringe-benefits including luncheon vouchers.

PRODUCT MANAGER (Timesharing)

CITY — c £8,000 Total + Car

A senior position has arisen within a successful and well-established computer services group. The company operates a variety of sophisticated systems for investment and financial applications.

Responsibilities will include identifying market areas for the extension and enhancement of the company's services and making recommendations for the more efficient use of their resources. The person will report at director level and will be expected to play a positive part in investigating and proposing the future direction of the company.

The ideal applicant will have timesharing and direct selling experience. Candidates should have programming knowledge and be experienced in specifying requirements and preparing proposals.

The position offers the opportunity to progress a rewarding career. A realistic commencing salary package will be offered to the successful candidate.

ANALYST/PROGRAMMER

WEST LONDON — c. £5,500

Our Client is looking for an experienced COBOL programmer who has been involved with some systems work. The Analyst/Programmer will take project responsibility for a new system, developing the system from design through to implementation.

This would be a good opportunity for an experienced programmer who would like to become involved with modern computer technology while enhancing his/her career development as a team leader with project control responsibility.

The installation, situated close to the M4, offers a good benefit package and, where necessary, assistance with relocation expenses.

Please telephone for a confidential discussion or write to:
30 Fleet Street London EC4Y 1AA
01-353 5868

D.P. Project Manager

£7,000 + car

Our client, a major Company within a large UK group, distributes industrial products from over 40 locations throughout the U.K. The Head Office is situated in new modern premises in Blackburn.

To fulfil the next stage of the Company's plans for growth and development a new appointment of D.P. Project Manager is to be made. Possibly a computer science graduate already a No. 2, who wants to be a No. 1. This is a green field's appointment where the successful applicant will be expected to oversee and develop, from scratch, the total introduction and operation of a new in-house installation.

This is not just a routine DP job. Ideally the man or women appointed should have experience of project management, software house consultancy, commercial systems design and programming, as well as on-line and terminal experience of 1900 and 2903 I.C.L. installations. Preferred age is 28+.

Salary will be £7,000 + car with excellent terms of employment and removal assistance, where appropriate.

Write with full personal and career details to Position No. AGD 6241, Austin Knight Limited, London W1A 1DS.

Applications are forwarded to the client concerned therefore companies in which you are interested should be listed in a covering letter to the Position Number Supervisor.

AK ADVERTISING

OPERATORS — READ THIS!

You have been working on-shift for over 12 months and now is the time when career progression, salary and the working environment is becoming important to you.

We have clients ranging from small rural sites to large bureau installations, who are looking for operators with experience of IBM, ICL, HONEYWELL, NCR or BURROUGHS mainframes.

Why not telephone me to discuss the range of opportunities available in the area you wish to work.

Telephone in absolute confidance:
Ray Slattery

D.P. RECRUITMENT LIMITED
Kent House, 87 Regent Street, London W1R 7HF
Tel: 01-437 2062/3/4 (24-HOUR ANSAPHONE)
Computing Services Association

wordplex

TECHNICAL SUPPORT SPECIALISTS

c £4750 + car

Wordplex Ltd is an advanced intelligent-VDU based word processing system which provides both stand-alone and multi-station capability. The multi-station system has a CPU with dual processors and mass exchangeable disk storage.

We have vacancies for a number of technical staff in the areas of systems and software support.

Systems support staff should have an understanding of mini computer systems plus an in-depth knowledge of systems analysis. They will be required to provide pre-sales support, systems design for complex customer configurations and identifying and evaluating potential areas for future development.

Software support staff should have an in-depth knowledge of assembler programming on mini computers. They will be required to support existing word processing software and communications emulators as well as developing special facilities to meet specific customer requirements.

These posts, on occasions involve assisting at customer installations.

If you are interested in one of these positions please write in the first instance, giving career details to date, to.

D. Elliott, Esq, Technical Manager, Wordplex Limited, Floor, Liverpool Victoria House, 7 Cheapside, Reading, Berkshire.

or telephone Reading 57036

RPG PROGRAMMERS

with all levels of experience required for bureau and facilities management installations. Interesting work and top remuneration for right applicants.

Call 01-549 8933 quoting CW100 NOW, or write 12 Canbury Passage, Richmond Road, Kingston-upon-Thames, Surrey.

THE UNIVERSITY OF ASTON IN BIRMINGHAM

ADMINISTRATIVE DATA PROCESSING UNIT

ANALYST/PROGRAMMER AND PROGRAMMER

Applications are invited from suitably experienced candidates (male/female) for the above two posts. The Administrative Data Processing Unit, based on an I.C.L. 2903 installation, serves the administrative needs of the University, e.g. financial and management accounting, staff and student records. The Analyst/Programmer will report through the Systems Analyst to the Data Processing Manager. Applicants must have considerable programming experience in COBOL and have had some recent involvement in systems design. The Analyst/Programmer will be initially responsible for a sub-system of a financial accounts and reports system currently under development. Salary will be in accordance with the Other Related 1A scale — £2904 to £5427 per annum.

The Programmer will also report through the Systems Analyst to the Data Processing Manager. Applicants should have two years' relevant programming experience at least one year of which should be in COBOL. Experience of modular programming would be an advantage. Salary will be in accordance with the Other Related 1B scale — £2904 to £4011 per annum.

Application forms for both posts are available from Mr A. G. Ross, Administrative Assistant, Staffing Department, The University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET, quoting reference number 8/007/CW.

PROGRAMMERS AND ANALYSTS

Circa £2,000 - £6,000 negotiable

We are an established Software House specialising in commercial applications and require the following staff to work on visible record and minicomputers.

SENIOR PROGRAMMER — having at least two years experience of commercial applications.

ANALYSTS — having one year systems practise in addition to sound programming background.

PROGRAMMERS — having at least one year's programming experience

JUNIOR PROGRAMMERS — having up to one year's programming experience.

Experience on Assembler, Fortran, Neat 3 or Cobol would be an advantage, however, training will be provided where necessary.

Applications in writing stating full details of experience, employer, age and salary to:

SIMDELL — SIMDELL LTD, MARSHALL ..., MANOR ROAD, COVENTRY.

Telemecanique

FREELANCE COBOL ANALYST PROGRAMMERS

for S.O.P. system on Honeywell 31/60

Duration of contract and salary to be negotiated.

Please telephone or write to.

R. G. Harris, Telemecanique Electrique (GB) Ltd, Hanwood, Ashford, Kent. Tel: Ashford 21311, Ext. 131

AJK RECRUITMENT

ICL 1904A OPERATOR

For E1 installation — two years GII experience, four shift system, pension scheme — LVs, 3 weeks holidays.

Salary to £3,300 p.a.

SENIOR OPERATOR

Three years + IBM 360/50 DOS/GRASP/POWER experience — four shift system for East London installation.

Salary £3,500 aae

SHIFT LEADER

Three shift system — ICL 1902A installation two years + experience. LVs + Bonus W.1. Company.

Salary £3,000 +

IBM 370 OPERATOR

Essex company requires 18 months + experience with DOS/VS/POWER. Two shift system, bonus, S/C +. Four weeks holidays.

Salary £3,100 pa

SENIOR OPERATOR

IBM 370/145 experience with DOS VS POWER for North London Company. Two/three years overall experience.

Salary £3,800 p.a.

IBM OPERATOR

Central London installation. Days only — IBM OS/JCL experience essential

Salary to £3,000 pa

CHIEF OPERATOR

For E.C.1. installation. Three years + ICL 1900 or 2900 experience. Days only.

Salary £4,000 pa.

HONEYWELL OPERATOR

GCOS experience. 1 year to 18 months for North London installation. Three shift system — H6000 machine.

Salary £2,500 +

BURROUGHS OPERATOR

To operate a twin B4700 on a 12 hour shift system. Equivalent experience accepted on medium sized machines.

Salary to £4,500 p.a.

OPERATORS

For ICL 1900 installation — two shift system, nine months + experience for W.1. company. LVs + O/T.

Salary £3,000 - £3,500 p.a.

OPERATORS

North London company requires six months + experience on IBM System 3 installations. Days only — S C four weeks hols

Salary Neg to £3,000 pa

TECHNICAL SUPPORT

Two years ICL 1900 GII or GII+ and MACRO writing experience for W4 company. Days only + Bonus.

Salary £3,500 +

ICL 1902S OPERATOR

1 year to 18 months experience with Geo. II. 12 hour shifts for S.E.1 company.

Salary to £3,400 p.a.

IBM 360/50 OPERATOR

Three shift system — two years + experience DOS. Machine runs under OSM VT HASP. Three weeks holidays — W.1

Salary Neg — aae

ICL 1902S OPERATOR

Surrey installation need 18 months + experience ICL Geo. II. Two shift system.

Salary £3,000 + Neg

JUNIOR OPERATOR

6 months + experience IBM 370 125 DOS or DOS VS — age immaterial. Three shift system for Surrey based company.

Salary Neg aae

AJK RECRUITMENT LIMITED (Emp. Agy.)
26 Chilworth Street, London, W.2 01-402 0933

SUMMER SNAPS!

Systems Consultants £6,000-£9,500

CENTRAL LONOON

Seven lerge well-established consultencies wish to recluit systeme people with all-round experience on third generation equipment and the right personality to deal with clionts who require e first rate service. Technical communications consultents sre olso required where in-depth implementation experience ol ISM or ICL T/P message switching notworks etc., are essentiel. Excellent fringe benefits end prospects.
CW 31/1 Michael

Junior Programmers £2,500-£3,750

LONOON, HOME COUNTIES

Only one year's experience? Then you ere in great demsnd. We heve e lerge selection of first-rate companies who need people like you.
CW 31/2 Annette

Operators to Shift Leaders £2,000-£4,000 (Incl.)

LONOON & HOME COUNTIES

We heve meny vacencies covering ell types ol mechines end locetions. Some firms will retrein from one menufscturer to enother. Remember these positions ere for shift working only. Hurry whilst stocks lest.
CW 31/3 Annette

Contract Programmers to £190 p.w.

U.K.

Immediate requirements for ISM COSOL under OOS or OS for C. London. PL/1, OS or CICS. POP/11 or good IMS for verious locations for 3 months plus. Also ISM vacancies In GERMANY, FRANCE, SELGIUM & HOLLANO. Ask for the Contracts Officer on 01-995 2236.
CW 31/4 Michael

Successful Salesmen to £12K quota earnings

U.K.

We now heve ten different firms for both herdware snd systems only companies who sre snxious to msst successful salesmsn In this industry. Thsy must have previous relevent smell systems experience (some VRCs will be considered). All firms heve bonus schemes end cars or car ellowence. Most positions in S.E. Englend, but 2 in Midlsnds.
CW 31/5 Michael

Mini Computer Programmers to £5,950

U.K.

Your expsrience is required now. A very lerge number of vecencies ere registered where e knowledge of Assembler or communicetions experience is essentiel (VRC programmers would elso be considered). Opportunities exist in S.W., N.W. or W. London, Surrey, Herts. snd Menchester in this exciting end rewarding field. There hss elso besn registered some overseas posts to psople with 5 or more years In mini computers.
CW 31/6 Michael

Time Sharing Programmers to £6,000

C. LONOON

If you heve had time sharing experience involving ths use of FORTRAN, SASIC or ASSEMSLER, then we heve four nationally known companise who would offer you sn exciting job in pre- or post-sales support. Some offer gensrous bonus schemes.
CW 31/7 Michael

UCA

DATA EXPRESS HOUSE
PROSPECT PLACE
HEATHFIELD TERRACE
CHISWICK W4 3BR
Recruitment Consultants

01-995 3883 or
01-958 6138 evenings

World Sales Engineers

For a new project team exploiting Europe's foremost Communication Equipment to £15,000

Based London/Europe

Our Client is a major British and International force in the field of Electronic Telecommunication. Traditionally market leaders, by sales and innovation, they are now putting together a multi disciplined team to develop and exploit internationally an advanced range of processor controlled exchange equipment. The team will work Initially between London and Western Europe but sales will be directed throughout the world.

These posts are to work as the spearhead of a project team tackling the world market for telephone exchange equipment. The product is modern and flexible. Competition is tough but the Company's back up facilities are world wide and second to none.

Candidates will be experienced international travellers, capable of dealing with and selling to Governments and major public and private telecommunications operators. They will be adaptable to the traditions and customs of countries throughout the world. Foreign languages and telephony will be obvious advantages, but proven electronic capital goods sales experience is the key.

Salary is negotiable and will reflect ability, experience and location. Benefits are excellent.

Applicants, men or women, should apply in strict confidence to E.M. Linnell, who is advising the Company, quoting Ref. [illegible] CW and stating experience, age, qualifications and present salary to:

CB-Linnell Limited
8 Oxford Street, Nottinghom
MANAGEMENT SELECTION CONSULTANTS
NOTTINGHAM · LONDON

Freelance Experienced PLAN Programmer
Romford, Essex
£165 per week

Must have experience of George 3 operating systems and PLAN programming. Required immediately for 3 months' contract with possible option of monthly renewal.

Apply in first instance to M. Daglish, Austin Knight Ltd., 20 Soho Square, London W1A 1OS

TECHNICAL PROGRAMMER/ ANALYST (REF. CW/2/77)

Phillips Petroleum Company, one of the pioneers in North Sea Oil development has a newly created opportunity within its established Data Processing department at its major crude oil/NGL processing and terminal facility at Seal Sands, Cleveland.

Our team requirement is for a Programmer/Analyst with experience in operations research and the necessary ability to utilise computer techniques to solve process problems. The successful candidate will be required to work closely with engineering and operations personnel in order to translate their requirement into practical systems design and implementation.

It is therefore desirable that applicants should possess a Chemical Engineering degree, a knowledge of Fortran or equivalent and have experience in an IBM environment utilising mini-computers, on line systems and remote job entry.

This appointment offers a competitive commencing salary and conditions of service are those one would expect from a major organisation such as Phillips Petroleum Company.

If you are interested in this vacancy, please write for an application form (quoting job reference number) to: Mr. B. Sutherland, Personnel/Training Officer.

PHILLIPS PETROLEUM COMPANY
Teesside Operations, Seal Sands, Middlesbrough, Cleveland TS2 1RO. Tel: 0642 546411

Computer Programmers Coventry

Our project teams are working in COBOL (and some NIMMS—DMS2) on a variety of production, commercial and accounting systems. Having started from scratch in 1974, the emphasis is very much on development rather than maintenance.

Hardware is an ICL 1901T and a 1902T, with the usual peripherals and VDU's which are used for data capture and enquiry.

To keep pace with the Division's expanding order book we are increasing the size of our Data Processing Department—the people we want are:

Senior Programmer

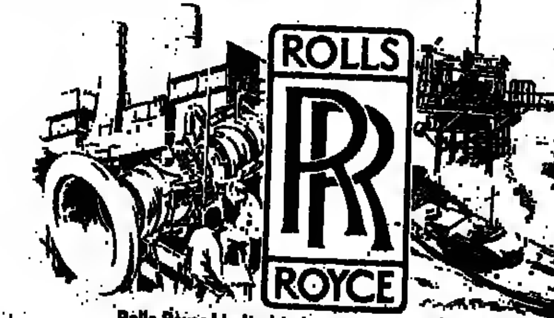
of proven ability with a minimum of 2 years relevant experience. This position involves participation in detailed system design and program specification in addition to normal programming duties.

Programmer

with at least 1 year's COBOL experience. The main task is the design, coding, testing and documentation of programs. Successful applicants will be expected to make a full contribution to the work of their team.

For both of the above positions, the educational requirement necessary is at least G.C.E.'s A-level. Salaries are highly competitive, overtime is paid and assistance with removal expenses will be provided where appropriate.

Write or phone for an application form to Mrs. K. Brown, Personnel Department, Rolls-Royce Limited, Industrial and Marine Division, P.O. Box 72, Ansty, Coventry CV7 9JR. Tel: Coventry (STD 0203) 613211.



Rolls-Royce Limited, Industrial and Marine Division

UNIVERSITY OF STIRLING
Re-Advertisement

SHIFT LEADER

Scale £3343-£3907 p.a. including supplements (under review)

An opportunity now arises to work on this very attractive campus of the gateway to the Scottish Highlands in an area offering a wide range of leisure activities and Edinburgh and Glasgow are within easy reach.

The Computer Unit's two shifts of operators provide interactive and batch facilities on a 192K, 5 EDS S ICL 4130 for research, teaching and administration. A remote batch terminal for connection to Manchester, Edinburgh, etc., is on order.

Applicants, should preferably have three years' operating experience; knowledge of 4130/OES 2 would be a considerable advantage.

Applications, giving details of present salary, education and career to date, together with the names of two referees, should be sent to The Secretary (CW), University of Stirling, Stirling, FK9 4LA, as soon as possible.

CAPITAL APPTS.

LECTURERS

Vacancies in all areas for technical and commercial lecturing.

SALARIES to £5,800

34, Percy St. London W.1.
637 5551 day; 445 0968 eve.

Senior Operator £3.9k
Our client, a large retail organisation, who have offices in the West End require an operator who will assume the roll of Shift Leader when the company convert to a 3-shift system. They operate under DOS POWER. Ref 133

Days Operator £3.5k
Min 18 mths' operating experience of 360/370 mainframes for this small 360 concern on the Essex/London borders. Ref 176

Operator £3.7k
This SYS 3/15 banking company based in the city need an operator to work a fixed evening shift (1300-2100 hrs). Ref 147

Operator £3.3k
SYS 3 operator to working In North London on a 2-shift system. Ref 149

DOS Operator £3.6k
A city position offering banking benefits require operator with 18 mths' DOS experience to work a 370/135. Ref 181

OS Operator £4k
360/65 in Herts needs a good OS person with a minimum of 2 years solid operating experience. Ref 180

Cobol Prog to £7k
Our client who run on our own 370/135 require a self-motivated inventive programmer who also has a knowledge of DOS operating systems. SW1. Ref 112

PL1 to £6k
We have several clients both in the city and W/E.

RPG II to £5K
Many vacancies all areas.

X•Calibur
COMPUTER SERVICES

OPPORTUNITIES IN SYSTEMS AND PROGRAMMING

SOUTH BIRMINGHAM

ANALYSTS PROGRAMMERS

ATTRACTIVE SALARIES PLUS PENDING PAY INCREASES

This Company, pioneers and market leaders in their field, are restructuring their Management Services Department into three development teams creating genuine career prospects for rapid advancement.

Within this forward-thinking installation currently utilising recently upgraded ICL equipment and presently developing on-line facilities using DATA-DRIVE, opportunities have arisen for:

ANALYSTS

- at least two years' systems experience, and some programming knowledge, preferably gained in a commercial manufacturing environment.
- the ability to liaise with user departments
- ideally, on-line experience

PROGRAMMERS

- twelve to eighteen months ICL COBOL programming experience
- preferably, some knowledge of systems analysis
- a desire to move into an Analyst/Programmer role
- the ability to work in a team environment

Carefully planned On-Line Development Plans Include Order Processing and Stock Recording, with further Systems Development Plans to include Work-in-Progress, Financial Budgeting, Production Control, plus various other commercial systems.

Excellent company benefits including on-going Training Facilities, Flexi-time, Pension Scheme, Annual Bonus, Relocation Assistance, and fully paid overtime.

CONTACT: DALE HADLEY ON 021-236 3781 **REF. NO. 77/06/14**

SPECIALIST COMPUTER RECRUITMENT LTD.
BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR
MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD
LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

SCR

Computing Services Association

JBA

Technical Author

Berkshire c. £6000

An international consultancy have a vacancy for an experienced applications software author. The successful appointee will enter a team environment, will be a self-starting, flexible individual with the ability to write clear and concise procedural descriptions. Senior programmers or analysts who can demonstrate a background of self-documented work will be considered.
Excellent fringe benefits are offered.

Contact: Mike Creamer

Technical Authors & Engineers

Home Counties/South up to £5500

A number of our clients are urgently seeking experienced authors (in some cases graduate trainee authors) to carry out documentation work on a variety of technical computer based systems, or commercial systems (with hardware or software bias). Experienced Computer Engineers, in field support or instructional areas are also sought.
Excellent staff benefits and prospects.

Contact: Mike Creamer

COBOL/PLAN Programmers

Middlesex up to £4500

A large international manufacturing company are seeking COBOL and/or PLAN programmers with at least 1 year's experience in industry. Recognised large main frame experience is ideal; applicants interested in rapid promotional prospects preferable:
Attractive company benefits and generous relocation package offered.

Contact: Mike Creamer

Instructor

Herts. Neg. c. £6000

Our client, a progressive and expanding mini computer manufacturer, requires an instructor to provide training courses in the application of computers to business systems.
The successful individual will have considerable experience of business orientated applications including the development of accountancy systems. Additional knowledge in the stock/production control areas would be an advantage. Previous instructing experience is obviously desirable but candidates with the potential, enthusiasm and flexibility of approach to training will be considered.
Excellent opportunity for career advancement.

Contact: Margaret Stevens

FORTRAN/RSX11 Programmer

London c. £5000

Our client, an international organisation, has a vacancy for a software specialist to work on new systems in the commercial area. Applicants must have several years experience in d.p. and be competent in FORTRAN using RSX11. A commercial or communications background would be preferred. This is an exciting opportunity to join a large well-known company.
Salaries negotiable. Excellent fringe benefits.

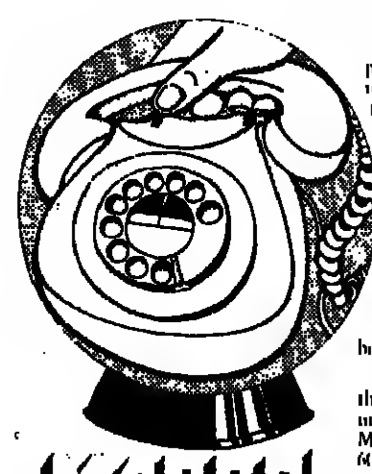
Contact: Margaret Stevens

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES
International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

S&P Consultants or Project Leaders

This Sunday dial your future on 01-402 9355



Marcol are currently into an expansion phase which will see the Marcol Group as one of the major computer service companies in the U.K and Europe. Our current development areas include extensive 2900 practical experience, international message switching design, and advanced systems in the aerospace and petrochemical industries.

In order to sustain this growth, we need a number of senior people with solid experience of programming and/or systems with a background of IBM, ICL, Honeywell, Burroughs, Univac.

Salaries are high and future rewards will be based on performance.

Phone in this Sunday or come round to the office between 10a.m. and 4p.m. and find out what the future is with Marcol.
Marcol Computer Services Ltd.,
60 Queen's Gardens, London, W.2.

MARCOL An associate of The Norwich Union Group. NORWICH UNION

CAPITAL APPTS.

COMPUTER SERVICE ENGINEERS

Phone for free jobs list all areas

SALARIES TO £6000

34, Percy St. London, W.1.

637 5551 day, 445 0468 eve.

QUEEN MARY COLLEGE
University of London

COMPUTER CENTRE USER DOCUMENTATION

Applications are invited from graduates with computer experience and the ability to write clearly and concisely. The successful candidate will be responsible for writing user documentation describing both the services available to computers users and how to use them. The Centre currently provides a large multi-access service on twin ICL 1904S's for both research and teaching throughout the University of London. An ICL 2980 is expected to be installed and a major part of the documentation produced will be for the services developed on this new computer.

Salary in range £2904-£4811 per annum, plus £450 London Allowance. Applicants should write, giving full details (including the names and addresses of two referees) to The Registrar (CW), Queen Mary College, Mile End Road, London E1 4NS

Real-Time Mini Computer Programmers and Team Leaders

EMI Medical Limited, Brain Scanner Division, Radlett, Herts.

We require innovative programmers to design, develop and support software for the EMI-Brain Scanner. The Scanner is a unique blend of electronic and mechanical engineering, physics and software. We now wish to expand our small interdisciplinary development team.

The challenge to produce programmes for new and existing systems calls for mechanical, peripheral handling and user interface expertise.

Your background should be in computer programming, principally in real-time applications with mini computers or microprocessors. It would be useful to have had some experience of working closely with electronic engineers during the development of a system.

You should have a degree or equivalent in computer science or in science or engineering subjects. You should have programmed extensively at low level, but a knowledge of high level languages would be useful.

PROGRAMMER

Positions carry salaries of up to £5,000 per annum, according to experience. Candidates should have a minimum of two years' experience.

TEAM LEADERS

You would command a salary of up to £5,500 per annum, and we are looking for at least four years' experience.

Conditions of employment are excellent, as you would expect from a new division of a large international company, we offer four weeks' holiday, a subsidised canteen, sickness and pension schemes and staff discounts on many products. We would consider the payment of re-location expenses where appropriate.

To apply, please telephone or write to **Richard Morley, EMI Medical Ltd., Brain Scanner Division, Colney Street, St. Albans, Herts. AL2 2ER. Telephone Radlett 4722.**

EMI **EMI Medical Ltd**
The International music, electronics and leisure Group.

CONTRACT

U.K.

Up to £250 per week in a variety of [illegible]

SYSTEMS ANALYSTS
ANALYST/PROGS —
IBM COBOL
SYSTEM 4 COBOL
BURROUGHS 3700/6700
COBOL
ASSEMBLER CICS
PL1
HONEYWELL 6000 —
IDS/TDS COBOL
IMS SYSTEMS DESIGNER
1900 COBOL/PLAN
RPG II

U.S.A.

[illegible]

ANALYST/PROGRAMMERS
(with [illegible] programming)

IMS & CICS useful
PROGRAMMERS:—
IBM COBOL
PL1
BAL
IMS D.B.
CICS
PDP RSTS

[illegible]

[illegible] Atlanta, Texas and California

For further information ring
Christina Carr or Ann Collins on 01-437 2062/3/4

D.P. SUPPORT SERVICES LIMITED
Kent House, 87 Regent Street, London W.1

HERTS., BEDS. & BUCKS.

REAL-TIME SYSTEMS DESIGNER c £7000
To lead project team in new software development company. Real-time exp. essential.

OPERATORS to £4000
IBM OS/MFT or OS/VS operating experience required for large progressive installation.

PROGRAMMERS to £5500
New Commercial application development for well established Mini manufacturer. COBOL and/or Assembler experienced required.

SYSTEMS PROGRAMMERS to £5500
PL1 and Assembler background necessary with knowledge of SHADOW and DBOMP an advantage.

Contact: Roy Brackenbury, St. Albans [illegible]

BLUE ARROW [illegible]
Blue Arrow House, 3 Holywell Hill, St. Albans, Herts.

Worcestershire to £6K

[illegible] Worcestershire and [illegible] Programmers and [illegible]

[illegible]

[illegible] Analysts [illegible]

[illegible] 0272 45085 [illegible]

ab executive (Bristol)

WESSEX WATER AUTHORITY

OPERATIONS MANAGER

Bath £6555 - £7077
plus supplements of £520

Wessex Water is one of nine Regional Water Authorities in England which were set up in April 1974. Although being one of the smaller Authorities, Wessex is responsible for managing the complete water cycle over an area covering the counties of Avon, Dorset and Somerset and the majority of Wiltshire.

This is a new post; based at the Authority's offices in Bath and has been created as the result of a decision to centralise computer facilities to an IBM 370/138 (OS/VS1) in the early part of next year. The Operations Manager will head the Computer Operations Section which involves responsibility for staff with the mainframe at Bath and terminal staff located in Poole, Bridgwater and Bristol. He/she will be responsible to the Computer Services Manager for the computer facilities and associated communications network.

It is unlikely that the successful applicant would have had less than 10 years' experience in the computer field with a minimum of 5 years at senior level.

Assistance with relocation expenses to this very pleasant part of the country will be considered in appropriate cases; and a car user allowance is also applicable.

Application forms quoting ref. 254/11 and job descriptions obtainable from Mrs. V. M. Gould, Wessex Water Authority, Techno House, Radcliffe Way, Bristol, and should be returned no later than 6th September, 1977.

Wessex Water

ANALYST-PROGRAMM[E]

required by an

INTERNATIONAL INSURANCE G[ROUP]

for its main UK Subsidiary

(premium income £22m) based in the [City of] London

REQUIRED:

—At least 5 years' experience in pr[…] implementing computer applications
—Knowledge of RPG 2 and if possible [of] IBM 370/125.
—Working knowledge of French as [the] Paris Head Office is necessary.
—Experience in insurance would [be an] advantage.

OFFERED:

—Salary circa £6,000.
—Fringe benefits: Excellent Pension […] BUPA, 4 weeks' holiday after one year […]
—Good position in a strong […] organisation.
—Possibility of increased responsibilit[y …] or two years.

Apply in writing to:

SCOR, Plantation House, 23 Rood Lane, London […]

NEW OPPORTUNITIES

Altergo are at the forefront of **Series/1** development.

They now need **TWO PROGRAMMERS** to join the team currently developing software for their machine which is due for delivery this month.

The **TWO PROGRAMMERS** must have at least 3 years' experience in **ASSEMBLER** on IBM 360/370 or a mini.

Programmer 1 should have software development expertise including real-time and communications. Whilst **Programmer 2** should have application expertise, preferably in a real-time environment and be capable of producing software specifications.

If you want to work on Series/1 can you afford to miss this opportunity?

BUSINESS CONSULTANTS

We require Business Consultants with specialist experience of Stock Control, Order Processing, Financial or Banking systems to carry out major projects in the UK and overseas.

Applicants must have the following:
—at least 5 years' analysis experience.
—a background of IBM mainframes and a knowledge of data base and teleprocessing techniques would be an advantage.
—ability to communicate to both D.P. and non-D.P. people.
—experience of managing a project from feasibility study through to user implementation.

Contact Chris Dunford.

PL/1 PROGRAMMERS & ANALYSTS

Programmers and analysts are urgently required to meet our expanding customer base. Applicants must have 2 years' experience of IBM systems using PL/1 or COBOL and a knowledge of database or TP techniques would be useful, but not essential.

Various career developments are available to suitable employees. These cover team leader positions, IMS DB and/or DC consultants or a transfer to another area of the company such as education or mini computers.

Contact—Frank Park.

RPGII PROGRAMMERS

Altergo Business Systems Limited is the foremost consultancy specializing on **IBM SYSTEM/3** and **SERIES/30 COMPUTERS** using **RPG11** and both **BATCH AND ON-LINE** techniques.

We require **PROGRAMMERS** with 3-4 years' relevant experience who possess a professionally competent and intelligent approach to user systems software.

YOU'RE AMBITIOUS. CAN YOU AFFORD TO MISS THIS OPPORTUNITY?

Contact Brian Walker or Barry Whiteman.

Altergo is one of the largest independent computer consultancies.

Altergo's continuing success rests upon a highly motivated team of sales, support and development people. As our markets have expanded so have job opportunities for our staff — in an environment where ability and hard work are rewarded, both financially and by internal career opportunities.

The right people will join the strongest team of computing specialists in the country, where a constant interchange of ideas and experience create a stimulating working environment.

Altergo offer all the benefits befitting a successful and dynamic company including a high salary, expenses, overtime, bonus scheme and overseas opportunities.

altergo **WARWICK HOUSE, 38 SOHO SQUARE, LONDON W1V 5DF**
Telephone 01-734 9681

A COMPANY CAR plus SALARY TO £6,000 plus BONUS plus EUROPEAN TRAVEL

EUROLOGIC SOFTWARE is a highly successful systems consultancy and has a requirement for several Professional Programmers and Analyst / Programmers. We want to meet people with a minimum of two years' in depth experience in small computer systems — in particular in the following areas:

★ **RPG 11**
On either IBM or ICL small business computers

★ **PDP 11**
Using DIBOL, BASIC, BASIC+MACRO

★ **ICL System 10 Assembler**

You will be working on a range of customer applications throughout the UK and Europe. We are able to offer excellent career prospects together with a high degree of job interest.

Call Richard Barker on 01-549 8933 to exchange information, or write to him at the address below. Meetings can be arranged in Kingston or in Central London outside normal office hours if required.

Eurologic Software Ltd. **12 Canbury Passage, Richmond Road, Kingston upon Thames, Surrey**

EUROLOGIC A Member of the Wellorax Group

ET DEI IPSI EIS QUI OCCASIONI DESINT AUXILIUM FERRE NON POSSUNT

We are the newly-formed information processing subsidiary of a large multi-national group. One of our objectives is to become the leading European supplier of microprocessor based small business systems. We have immediate vacancies for several top specialists, men or women who, by their contribution, will justify substantial rewards both materially and in job satisfaction.

We expect candidates to be of degree standard though they may not have a certificate to prove it. Analytical ability, tenacity, initiative and a capacity for attention to detail are essential; a strong sense of humour will help when the going gets tough. Those accustomed to inventing excuses for failure to meet deadlines will find the work uncongenial; those who deliver the goods will progress rapidly as the organisation develops. Basic salaries of up to £6000 plus car and the usual fringe benefits are offered. Additional payment will be made based on the profitability of individual projects. Location is London; some European travel may be necessary.

This is an opportunity to get in at the start of an exciting new venture — if you enjoy a challenge (or if you would like a translation) drop me a line.

TED DAVISON
SUNZL DATA SYSTEMS LTD.
CITY OFFICE
21/24 CHISWELL STREET
LONDON, EC1Y 4UD

MICROPROCESSOR ENGINEERS

Prime tasks: To establish a department which will:
1) Test, install and commission microprocessor based commercial systems
2) Develop new hardware to improve performance of these systems

Attributes:
Essential
Detailed knowledge of LSI/11 based hardware systems — especially with cartridge and floppy discs. Organising ability and man-management skills.
Preferred
Experience of networking LSI/11s and PDP 11s both locally and via Data Communications. Knowledge of PDP 11 Assembler and operating systems — especially RSTS and RT11.

Remarks: A training visit to the USA will be an early requirement.

SOFTWARE PROJECT LEADERS

Prime tasks: To carry out major software projects for turnkey systems using LSI/11 microprocessors.

Attributes:
Essential
At least three years' experience of commercial software applications (preferably with DEC hardware). A proven record of meeting agreed deadlines.
Preferred
Experience of PDP 11 Assembler, RSTS and RT11 operating systems and real time programming.

BRING YOUR ICL SYSTEM 10 EXPERIENCE TO DEVON

WDP is a well established Bureau and Software House currently expanding its services to cover the ICL System 10 range of computers.

We require an experienced Programmer or Analyst/Programmer to fill an important and responsible role on System 10 Software Contracts.

Applicants must be able to show their competence in ASSEMBLER and have a good working knowledge of the basic software. Experience in program design/specification and/or applications software would be an advantage.

The successful applicant will be offered a salary according to experience; assistance with removal expenses will be given.

Please contact:

Western Data Processing Ltd
7/8 Colleton Crescent
Exeter, Devon EX2 4DG
Tel: Exeter (0392) 34131

UNIVERSITY OF CAMBRIDGE COMPUTING SERVICE

The University Computing Service has vacancies for two computer Officers.

SYSTEMS PROGRAMMER

to be involved with the maintenance and development of operating systems software for the University's IBM 370/165 computer and associated communications and other equipment.

USER SERVICES PROGRAMMER

to be involved with all aspects of liaison with a large user population both in Cambridge and from many other Universities. Applicants should have a degree or equivalent qualification, experience of computer use in a university environment would be an advantage. Appointments will be to Computer Officership in Grade III or Grade IV on salary scales between £3,547 and £4,811 (plus USS benefits) according to age and experience. The University is reviewing these scales. Applications including statements of age, qualifications and relevant experience and the names of two referees should be sent to the Director of the University Computing Service, Computer Laboratory, Corn Exchange Street, Cambridge, CB2 3QG to reach him by not later than 31 August 1977.

Super Benefits CAMBRIDGESHIRE SYSTEMS ENGINEERS Salaries to £5,500 p.a.

(1900 PLAN & 370 ASSEMBLER backgrounds)

Our Client is a small, professional concern which is a market leader in its specific area of packed system sales, development and installation. It is soon to extend this pre-eminence into a fresh and exciting associated application area, and these positions are open at the start of this new venture.

Specifically you should have:
- ★ good PLAN and/or ASSEMBLER experience
- ★ sound 1900 or 370 based experience
- ★ the ability to work closely with clients and to act as professional, technical ambassador of the company
- ★ a preparedness to travel within the UK

Our Client offers:
- ★ re-location expenses
- ★ interest-free personal and car purchase loans
- ★ 4 weeks + holidays per annum
- ★ free BUPA and substantial non-contributory pension scheme

CONTACT: REG HEATH on 021-236 3781

REF. 77/08/6

SPECIALIST COMPUTER RECRUITMENT LTD.
BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR
MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD
LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

SCR

MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611

PROGS, ANALS

ESSEX to £5K

All levels of staff from trainee to senior analyst are required by our client, a multi-national company. They are currently installing an IBM System 3 and are designing and implementing production and financial systems. Initially the processing will be in batch mode; on-line systems are planned in the near future. RPG II experience is essential. Full training will be given to novice programmers and to those wishing to become analysts. Benefits include full relocation expenses, a yearly bonus scheme and the opportunity of joining a company where promotional prospects are both varied and excellent.

Contact Pam Quinlan.

SUPPORT ANAL c £6K

CENTRAL LONDON

A responsible and self-motivated person is required by our client to co-ordinate the systems and programming support required by their users. Liaison with both manufacturer and software house will be necessary to ensure this. You will also be responsible for the analysis of new system requirements, thus the ability to establish a close working relationship with users is a must. Commercial experience gained on mini computers is essential; a knowledge of O & M or accounting would be helpful. Priority will be given to those candidates with real time systems experience gained on DEC equipment.

Contact Pam Quinlan.

SUPPORT MNGR c £6K

LONDON

A well established international computer manufacturer requires a capable executive to manage all technical support for pre-sales activities and the implementation of customer systems using standard products. He/she must have a thorough knowledge of disc-based DP systems; experience of the complete implementation of computer systems through Sales Project or MIS involvement; one year's programming in a high-level language (pref. COBOL); and previous supervisory or management experience. Sales Support/DP Management/or Snr Systems Analysis backgrounds will be most appropriate.

Contact Peter Gorton.

SALES Total Earnings £12K

LONDON BASED

A major computer manufacturer is in the process of setting up a new division which will deal exclusively with the large manufacturing corporations. They require a mature sales person, with experience in this industry, who is capable of negotiating large contracts, at board level, and who also has the initiative to develop this new business venture. This position offers an ideal opportunity to be a member of a small team and to be in the right place when the future management structure is developed.

Contact Faye Ogilvie.

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

MANAGEMENT & EXECUTIVE SELECTION

Duncan Bransom Recruitment

SENIOR SYSTEMS CONSULTANT – £8.500

The Company
The Company is HERTZ, the world leaders in the car rental business. Their European Headquarters is at Isleworth, Middlesex, which is also the base for their Management Systems and Services Department. Operating in the dynamic car rental business, the company requires information systems that can respond quickly to new situations.

The Job
The job involves designing and writing innovative computer systems to operate on an I.B.M. mainframe using non-I.B.M. minis for front and processing.

In the dynamic car rental business the market place is constantly changing and with it the requirements for management information. Thus basic systems of an accounting nature have to be developed as well as the information systems that use them as a source of data.

Such systems need to be applicable to all countries in Europe, thus some travelling to the continent can be expected amounting to about two or three days per month.

You
You have had at least five years' experience in designing and installing systems — most of it in an I.B.M. mainframe environment where the installation language was Cobol, probably under OS.

Already you have proved your ability in managing staff either as a project leader, systems manager or data processing manager.

Now you are looking for a job where the pace is a hot one, where decisions are made quickly instead of through interminable committee meetings, and where you can be involved not only at the feasibility stage but right through to start-up and implementation.

Please write or telephone for an application form to:
Roger Griffiths, Duncan Bransom Ltd., 37, Hillcrest Road, Loughton, Essex
Telephone 01-508 5121

Duncan Bransom Limited

COMPUTING AND COMMUNICATIONS

JOIN THE PROFESSIONALS OF THE COMPUTING WORLD

Due to winning a number of prestigious contracts both in the UK and Europe, we are now looking for professionals of the computing world with skills in the following areas:

DEC PEOPLE	Both at home and abroad we need staff with RSTS and BASIC PLUS experience.
EUROPE & IN-HOUSE	Data General Programmers and Analysts with one to five years' experience. Knowledge of BASIC or COBOL or Assembler.
IBM TEAMS	To supplement our IBM teams we need staff who have worked on System 3 machines; or used IMS or RTAM packages; or have experience of operating IBM Operating Systems.
CORAL EXPERTISE	Programmers with a minimum of two years' experience. MEDICAL FIELD or ARGUS 700 knowledge an asset.
TECHNICAL AUTHOR	We are looking for an adaptable technical author to work on a wide variety of projects who has the ability to write both user and operating manuals.

If you meet these demands and you want to expand your career apply to Dawn Jeans, Personnel Officer, Leasco Software Limited, 150 Bath Road, Maidenhead. Telephone Maidenhead 23391.

Facilities and benefits offered include free recreational activities, car parking, lunches, modern offices, sickness and life benefits, part-contributory pension scheme. Generous allowance while working overseas.

Salaries negotiable in the range £3,500 - £9,000

Leasco

IBM System/3

London West Central

SENIOR ANALYST/ PROGRAMMER to £6,250 p.a.

RPG II PROGRAMMER to £3800

THE COMPANY: A well-established and profitable international organisation, who offer secure employment.

RESPONSIBILITIES AND REQUIRED BACKGROUND

The Senior Analyst/Programmer will handle all aspects of the development and implementation of systems, including programming. Some supervision of staff will also be involved.

Suitable candidates are likely to have at least 5 years' DP experience, some gained within an IBM environment. Competence in RPG or COBOL is also required.

Above all, applicants should be articulate, self-starting and have a professional approach to their work.

The Programmer will undertake programming work but will also become involved in applications systems.

Previous experience of programming is required, ideally on IBM EQUIPMENT.

Also required is the ability to understand and maintain complex systems. Age possibly early 20's.

PLEASE TELEPHONE WITHOUT DELAY or if you prefer, send a personal summary.

DPSC

Crown House, Morden, London SM4 5EU

recruitment division

01-540 8311

24-hour answering service

Computing Services Association

BECOME A TECHNICAL JOURNALIST ON

COMPUTER WEEKLY

We are looking for writers to join the successful and experienced team on Computer Weekly.

Essential qualities are proven computer experience or a qualification in computer-related studies, plus the ability to write quickly, accurately and clearly to meet strict deadlines.

People with operations experience and/or an in-depth software background will be given priority for the current vacancies. However, if your experience falls outside these areas, and you are interested in joining the team, why not contact us?

Writing for Computer Weekly is a job that opens up interesting new career possibilities for DP people. If you think you can meet our standards contact Malcolm Peltu, Editor, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU, giving brief biographical details.

Sales Demonstrator

We are looking for someone to demonstrate Sperry Univac data preparation and terminal equipment in the South of England. You would be prepared to travel away from home frequently and a clean driving licence is essential. You'll have a flair for getting on with people as well as the ability to train customer operators.

We offer a generous salary, plus car allowance and the normal large company benefits.

Write or telephone (you may reverse the charges) Nigel Harris at Sperry Univac, 65 Holborn Viaduct, London EC1P 1AB.

Telephone 01-236 1010 and arrange for an interview.

SPERRY UNIVAC

COMPUTER SYSTEMS

CAPITAL APPTS.

34, Percy St. London W.1.

FORTRAN

Programmers urgently required for Industrial and Scientific development

£3,500-£8,000

ALL AREAS

Phone for free list of vacancies

637 5551 day, 445 6468 eve.

Greater Glasgow Health Board

SYSTEMS DESIGNER

Salary Scale: £4008-£4883 + £520 flat rate supplements

Applications are invited for the above post within the Board's Computer Applications Unit. Candidates should have a good knowledge of systems design and the ability to supervise staff working in FORTRAN/PLAN.

Application form and further details may be obtained from the Personnel Officer, Greater Glasgow Health Board, 351 Sauchiehall Street, Glasgow G2 3HT, to whom completed forms should be returned by Wednesday, 31 August.

IMPERIAL COLLEGE

POSTDOCTORAL RESEARCH ASSISTANT

required with experience in COMPUTER PROGRAMMING, to work with Dr. H R Morris on an SRC Research Grant (1 year). The research will involve the development of new programmes to aid the automatic structure elucidation of biological molecules using a new COMPUTER/MASS SPECTROMETER installation.

Salary up to £4234 incl. London Allowance, + USS.

Applications including curriculum vitae and the names of two referees, should be sent to: Dr H. R. Morris, Biochemistry Dept., Imperial College, London, SW7, as soon as possible.

We have been retained by our client, a ten year old service bureau to recruit

THREE PROGRAMMERS

CENTRAL LONDON c £5,000

Our client, who is presently embarking on a new software house venture which heavily involves the use of MINI computers, requires candidates with a thorough working knowledge of COBOL together with a good understanding of an Assembler language.

It is envisaged that candidates have a minimum of two years' programming experience and the ability for creative thinking.

Although only a small company (less than thirty people) our client has satisfied a large number of demanding clientele for nearly ten years and therefore the opportunity to grow from within as the company continues its expansion, is excellent.

Our client would also arrange both in-house and manufacturers courses in Assembler or other according to candidates' background.

For more details and to arrange an informal interview please contact STUART WINFIELD on 01-439 9817/8 or (01-439 3933, 24 hours).

RECRUITMENT RESOURCES LIMITED

2 Gt. Marlborough Street
London W1V 1DG
01-439 9817/8

G PLAN

PL/1 PROGRAMMER

The makers of G-Plan furniture are seeking a programmer with at least 18 months' PL/1 experience, to join a small team.

The installation is a 370/125 operating under DOS/VS with POWER and we are currently implementing a trial T.P. Order Entry system under SHADOW/II.

The successful applicant will be expected to show considerable initiative and work with minimum supervision.

Conditions of Service and Salaries are very good.

Apply, stating details of experience, to:

Company Personnel Manager
E. GOMME LIMITED
P.O. Box 27
High Wycombe, Bucks.

BENEFITS INCLUDE INTERESTING WORK FOR A GOOD COMPANY IN NORTH LONDON

Sytems Software Programmer

We would like to hear from Software specialists with experience of a large mainframe or from CHIEF OPERATORS or SHIFT LEADERS with Honeywell 6000 or Level 66 who would like to be trained into the software area of maintenance and support.

Analyst/Programmer

For the development and maintenance of engineering systems on a Honeywell operating time sharing and remote job-entry terminals. Typical applications are logic simulation, test generation and analog circuit analysis involving interfaces with graphic systems. Applicants will need about one year's experience of FORTRAN or another mathematical language.

Telephone Mike Ratsch, 01-235 7030, Ext. 218

PER PROFESSIONAL and EXECUTIVE RECRUITMENT

This vacancy is open to male and female applicants

Programmer/Analyst for large mini-computer.

Marketing oriented applications.

Three factors pick out this job from the other ads: the machine, the environment and the programs. You will be working on a PDP 11/40 using RSTS, with 198K bytes (Basic Plus language) – so, by mini-computer standards, decidedly not so mini.

The small department of programmer/analysts and terminal operators serve in-house clients who are essentially marketing people and who (enough on its own to make the job attractive) understand the computer and don't need educating in its uses.

Most interestingly, though, the applications vary immensely from the usual payrolls and ledgers. The computer is used for marketing analysis, sales forecasting and product costs: there are new applications to be developed, but they too will be marketing oriented. Our candidate specification is wide: we need another team member and we'll pick the person to suit our style – young, practical and lively – whether he or she is basically a programmer, or has systems experience.

For this reason, the salary is variable too – but, whatever you are earning, if you are right for us the combination of job interest, super Knightsbridge offices and good salary will make sure you feel we are right for you.

Please write with full career details to: Jacqui Thomas, Recruitment & Training Officer, Avon Overseas Limited, Bowater House, 68-112 Knightsbridge, London, SW1X 7LR.

AVON

PROGRAMMERS, SENIOR PROGRAMMERS ANALYST/PROGRAMMERS, SYSTEMS ANALYSTS

IBM 360/370
ICL 1900, 2900, SYSTEM 4
UNIVAC 1100, 9030
HONEYWELL 2000
NCR CENTURY

BANKING
INSURANCE
MANUFACTURING
GOVERNMENT
GENERAL COMMERCIAL

COME AND TALK TO OUR MANAGEMENT AND STAFF ABOUT YOUR FUTURE AND OUR PRESENT AND FUTURE

at

THE GREAT EASTERN HOTEL LIVERPOOL STREET, E.C.2

(Just by Liverpool St. Station)

ON EITHER

Monday or Tuesday, the 22nd or 23rd of August

anytime from

12.00 noon to 9.00 p.m.

PROJECTS THROUGHOUT UK, BUT PRINCIPALLY IN LONDON AND THE HOME COUNTIES. WE ALSO HAVE A NUMBER OF MEDIUM AND LONG-TERM PROJECTS, STARTING SOON, IN THE MIDDLE EAST AND EUROPE

WE'RE LOOKING FOR PROFESSIONALS WHO CAN EFFECTIVELY USE THEIR SKILLS, IN DEMANDING AND CHALLENGING PROJECT SITUATIONS

MOUNCEY AND PARTNERS LIMITED

YORK HOUSE, EMPIRE WAY, WEMBLEY, MIDDLESEX. Telephone Number: 01-903 4901

Group Offices in Knightsbridge, Manchester, USA, Germany, France, Holland, Switzerland, Sweden and South America

SEDGWICK FORBES GROUP

International Insurance Brokers

MAJOR OPPORTUNITIES AT ALL LEVELS WITH ONE OF BRITAIN'S LARGEST INSURANCE BROKING GROUPS

I.B.M. 370/145 x 3
OS – VS/1
Database
Distributed Intelligence
Network of 125+ terminals

Based in Witham, Essex
Superb new offices
Excellent working conditions
Subsidised restaurant
Active sports and social club

OUR EXPANDING ORGANISATION

Our successful program of development is continuing to extend and integrate the U.K. broking systems using both database and distributed intelligence techniques.

In addition we are now expanding the system services organisation to provide data processing support for overseas members of the Sedgwick Forbes Group.

This has created a number of opportunities for experienced systems staff in both the development and production departments.

If you enjoy a stimulating and demanding environment come and talk to us.

Applications in the first instance to

Mrs J. Smith, Personnel Officer, Sedgwick Forbes Group, Grove House, Newland Street, Witham. Tel: Colchester 69191

Computer Specialists

for on-going projects and new systems development.

There's probably more computer experience to be gained on Zambia's Copperbelt than you ever imagined.

At their Central Services Division, the two major mining companies – Nchanga Consolidated Copper Mines Limited and Roan Consolidated Mines Limited – operate a wide range of computer based information and control systems, and are among *world leaders in developing computer applications* to the requirements of their industry. Production capacity on Zambia's Copperbelt is some 700,000 tonnes of refined copper a year.

Applications are invited from experienced

Systems Analysts and Programmers

with at least 2 years' experience on IBM equipment using PL/1, to join (on a 2 year renewable contract) small teams engaged in new systems development and improving existing technical and commercial systems.

Equipment at each of the two Divisions – one at Ndola, the other at Kitwe – includes a two megabyte IBM 370/158 installation with extensive peripheral equipment.

A great life

Salary? At least £5,500 p.a. at current exchange rates depending on experience and level of responsibility, and there's a tax free gratuity of *25% of salary, payable* annually in the UK or country of recruitment.

Living conditions too are well above what you would normally expect in a developing country: good houses and flats – most of them with gardens; domestic help; supermarket shopping where, despite local shortages, most things you are used to are easy to get; excellent kindergardens and schools for young children.

And the climate? Zambia's is one of the best anywhere in the world. Ideal for round-the-year swimming, sailing, tennis, golf, with access to fantastic scenery and safari-countryside.

Other benefits include free passages to and from Zambia, low cost accommodation, generous paid leave, children's education and travel allowances.

If you are interested, and have the relevant experience with good formal qualifications, send us the coupon.

£5,500-£7,000 a year
plus at least £3,000 tax free when you get back

Please send me further details and an application form

NAME .... AGE ....

ADDRESS ....

....

Position applied for ....

Experience ....

To: The Manager, Zambia Appointments Division,
Zimco House, 129-139 Finsbury Pavement, London EC2A 1NA

CW48

RCM
NCCM

SENIOR SYSTEMS ANALYST & PROGRAMMERS

Due to internal promotion we have a vacancy for an experienced Senior Systems Analyst

The successful applicant will have at least 3 years experience in Systems Analysis and will be thoroughly familiar with all aspects including the implementation of package programs. Experience of *working with computer based engineering production control systems* would be an added advantage

We also have vacancies for experienced Programmers. Applicants should have at least 2 years' Programming experience preferably in Cobol. Knowledge or experience of on-line techniques would also be an advantage.

Applicants should write stating their age, experience and current salary to: Mr. A Cockram, Personnel and Training Manager, Armitage Ware Limited, Armitage, Nr. Rugeley, Staffs.

armitage shanks

Armitage Ware Limited
Armitage, Rugeley Staffs, WS15 4BT

CITY – IBM OPERATOR £3300
An excellent opportunity exists for an operator with a minimum of 9 months DOS VS experience to work in a banking environment. The successful applicant, who should be mature and intelligent, will be required to work a 2-shift system. Generous fringe benefits include subsidised mortgage, annual bonus and LV's

CITY IBM SENIOR OPERATOR £4500
Our clients, a large financial organisation, require an operator with approximately 3 years OS VS1 experience. A high level of technical expertise is essential for this position which offers excellent career advancement. In addition to the attractive salary, benefits include subsidised mortgage and annual bonus

CITY ICL SHIFT LEADER £4000
A minimum of 4 years operating experience, ideally GEORGE II, is required to join a leading financial organisation. A two shift system is in operation and it is envisaged that the successful applicant will transfer to New Range 2900 hardware after a short period. Usual large company benefits apply including subsidised mortgage and LV's

C. LONDON ICL OPERATOR £3500
Applications are invited from operators with approximately 12 months GEORGE II experience to join this large industrial concern. A socially convenient shift system is in operation consisting primarily of DAY SHIFTS

CONTRACT OPERATIONS
OS VS1 Operators reqd for long term contract in the South East. GEORGE II Operators reqd for contract in Middlesex/West London

OPERATIONS VARIOUS

S SUP	IBM 370	4 yrs	OS VS1	CITY	£4500
OP	IBM 370	18 mths	OS VS1	LON/MX	£4000
SEN OP	IBM 370	12 mths	DOS VS	ESSEX	£3800
OP	IBM 370	12 mths	DOS VS	BUCKS	£3000
S LDR	ICL 1900	2 yrs	Geo II	SURREY	£3600
OP	ICL 1900	9 mths	Manual	C LON	£2899
O/CHI	ICL 1900	2 yrs	Geo II	ESSEX	£3800
OP	B4700	12 mths +	3rd Gen	SURREY	£Exc

Trainee Operators & Programmers are required urgently for London, Surrey and Middlesex areas

COMPUTER TWO THOUSAND
01-637 3285
217/218 TOTTENHAM CT. RD, W1P 9AF

Project Leader: To £5,000 + Bonus (app. £700) *Mini/Small Mainframe exp. Commercial applications in* rapidly expanding company.

Analysts: Newcastle: To £6,000. On Line and Interactive Systems. Pref. car owner/driver. HND level Customer Support role.

MANCHESTER AREA: To £6,500. T.P. and Communications exp. Commercial, Financial, Prod. Control Applications, Extrovert required. Pref. car owner/driver.

WEST YORKSHIRE: £4,000-£5,000. Cobol Programming background, mainly Financial applications. ICL Hardware.

HUDDERSFIELD: Analyst/Programmer. New development projects on I.B.M. Cobol or CICS exp. Good career development.

LEEDS: Analyst/Programmer. £3,500 - £4,500. Very little programming. Pref. with Communications exp. *Deal at Senior Management Level.*

LEEDS/BRADFORD: Programmers. £3,500 + review. On Line. Order Entry, Stock Control and Financial Systems. Cobol/Neat 3.

Managers/Analysts/Programmers/Operators: Jobs available in most parts of Yorkshire, Lancashire and Greater Manchester. Evening interviews available. For a confidential chat please ring Halifax 58231.

QRH COMPUTER RECRUITMENT
QUEENS ROAD MILLS, HALIFAX
WEST YORKS. HX1 4LR
HALIFAX (0422) 58231 (10 lines)

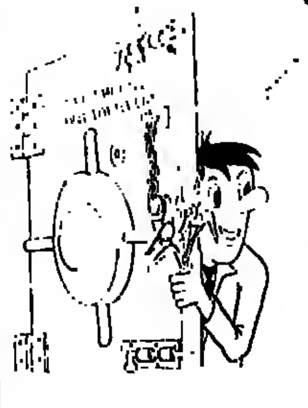
FREELANCE PROGRAMMERS

Yorkshire
IBM

OS; COBOL; CICS; DL/1

Box1884, Computer Weekly

H.P.S.L. .... H.P.S.L. .... H.P.S.L.



URGENTLY REQUIRED

PL/1 & B6700

Analysts & Programmers

for North, South and West London projects

HELLO!

IF

YOU ARE COMMITTED FOR ANY PERIOD OF TIME AHEAD, RING US WITH YOUR AVAILABILITY DATE AND WE WILL ENSURE THAT YOU ARE CONTACTED IN ADVANCE OF THE END OF YOUR PROJECT TO MAINTAIN WORK CONTINUITY. TEL: 01-437 8391/5338/3063
AMERSHAM (02403) 22201/2/3

H.P.S.L. .... H.P.S.L. .... H.P.S.L.

Sales Negotiators

Advanced Computer Peripherals

£8,000 – £10,000

Our client is a major systems manufacturer which has directed very large resources into the development of sophisticated computer peripherals and microprocessors. Its present range includes a powerful group of intelligent terminals which can be sold in almost unlimited combinations to suit individual customer requirements.

Individual sales, chiefly to financial organisations and service industries, can run into dozens of machines and may be worth anything up to £¼ million. Negotiating orders at this level is a specialised role for men or women with considerable experience of — or exposure to — advanced DP equipment of this kind. You may have gained this in computer selling itself, as a programmer or analyst, or as a user in business or industry.

Comprehensive sales and product training is provided for these posts (which are based throughout the UK), but to achieve the typical earnings of £8,000-£10,000 or above you must also expect to contribute a great deal of personal effort and initiative especially in technical discussion and negotiating.

Apart from a good basic salary of £4,000-£6,000 and a rising scale of commission, entirely performance-linked, there is a generous range of benefits and allowances. There is a guaranteed bonus during training, whilst you are establishing your full level of commission earnings

(Ref: S3588/CW)

Replies will be forwarded direct unopened and in confidence to the client unless addressed to our Security Manager listing companies to which they may not be sent. They should include comprehensive career details, not refer to previous correspondence with PA and quote the reference on the envelope.

PA Advertising

Hyde Park House, 60a Knightsbridge, London SW1X 7LE. tel: 01-235 6060 Telex: 27874

A member of PA International

Fareham Borough Council
BOROUGH TREASURER'S DEPARTMENT

Computer Programmer

Post T.48
Grade A.P.3/4
(£3,234-£4,014 plus 5% Supplement)

Honeywell 128 Disk and Magnetic Tapes. Work includes development of new applications and maintenance of existing programs. Applicants must have at least two years' relevant experience and be competent in the use of COBOL. The commencing salary will be determined having regard to experience.

£500 payable towards removal and disturbance in appropriate cases. Flexible working hours. Temporary housing accommodation may also be available.

For application forms and further details write to the Personnel and Management Services Officer, Box No. 16, Fareham Borough Council, High Street, Fareham, Hants PO16 7PP (Tel. Fareham 8100, ext. 232). Closing date for receipt of applications 5th September, 1977.

Data Processing Manager

If you have a thorough knowledge and at least seven years experience of systems, programming and operating and a background of management reporting, this could be the job for you in the National Agricultural Marketing Board (Namboard) in Zambia.

You will have control of an important department within the board, and the responsibility for, and control of, existing systems and development projects. Experience on either an ICL 1901 or 2903 configuration would be an added advantage.

Salary scale range from K6,920 to K8,600 per annum depending on experience. Car and soft furnishings loans. *Subsidised house rent.*

Apply to the Recruiting Officer, Zambian High Commission, Zambia House, 7-11 Cavendish Place, London W1, as soon as possible.

ZAMBIA

LONDON–CITY

1900 ANALYSTS & PROGRAMMERS

A NEW RANGE T/P FUTURE

Do you have the initiative to succeed in a compact environment with the backing of a large and sophisticated 1900 & 2900 user?
Read on:

Our Clients have constructed a successful project-team organisation offering:-

★A varied range of applications
★Rapid career development to Analysis & Project Leadership
★A future development geared towards Database and machine independence.

They seek Ambitious, Self-Motivated:

PROGRAMMERS
£5,200
★A minimum of 2 years' ICL COBOL
★PLAN & GEORGE II experience advantageous

ANALYST/PROGRAMMERS
to £5,700
★A minimum of 3 years' COBOL & GEORGE 2
★Ideally a knowledge of PLAN
★Some systems design & specification writing experience
★Ideally team-leadership background, for more senior positions.

SYSTEMS ANALYSTS
£6,300
★2 years Analysis experience
★Implementation of at least one major system
OR
(Junior Analyst)
★12 months Analysis with ICL hardware & programming background.

This represents a challenging career with an extraordinarily successful multi-mainframe group, whose attitude is reflected in on-going technical and competitive salaries. CONTACT: London Office: 01-935 0671

REF. 77/08/15

SCR

SPECIALIST COMPUTER RECRUITMENT LTD.
BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR
MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 3BD
LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

TPS

ONLINE SYSTEMS:

PROGRAMMERS
(Minimum 1 year ICL)
SENIOR PROGRAMMERS
SYSTEM DESIGNERS
SYSTEMS ANALYSTS
TP CONSULTANTS
PROJECT MANAGERS
SYSTEMS & PROGRAMMING LECTURERS

TELECOMPUTING

SPECIALISTS IN ONLINE TRANSACTION PROCESSING SYSTEMS

OXFORD LONDON AMSTERDAM

Telecomputing is established as the expert supplier of online systems for ICL computers. TPS is the world's leading tp monitor software on this range.

Our continuing success and outstanding growth means we need more people in all categories to work on client projects in London and other U.K. locations but particularly at our Oxford and Amsterdam offices.

IF YOU HAVE ONLINE SYSTEMS EXPERIENCE OR WISH TO ACQUIRE IT
WRITE OR PHONE:

TELECOMPUTING, SEACROFT TOWER, WEST WAY, BOTLEY, OXFORD (0865) 723621

16 Bedford Row
London WC1R 4EB
01-242 9356
Telex 21120

OCC

Specialists since 1971 in UK and international computer appointments

occ computer personnel limited

LARGE REAL-TIME SYSTEMS

to £7,000

Our client is a leading UK based Software House with units based in LONDON and HOME COUNTIES. A choice of base will be offered to the successful candidates.

A new unit has been set up to meet the requirement for 2900 customers in the systems and programming activities, running in 2 Operating Systems environments, VME/B and VME/K, for medium and large systems.

Two specialist teams are to be founded, one in VME/B and the other in VME/K. SENIOR ANALYSTS and PROGRAMMERS with large Real Time systems experience are required to staff these two units.

We are particularly interested in PROGRAMMERS with communication software experience (at least 3 years) and Team Leaders who have worked as Technical Managers. ANALYSTS should have been involved in the design and implementation of large Real Time systems or commissioning of applications using communication networks, for end users. They will have worked on the practical aspects of a customer requirement and have a minimum of 4 years' experience. AIRLINE RESERVATION experience would be particularly relevant. **Ref: 569/CW/RN.**

To apply for these positions, or for further information, please telephone or write to Renée Nute on 01-242 9356. If it would be more convenient to telephone in the evening or at weekends, please telephone 01-874 6372.

Computing Services Association

FREELANCERS
IMMEDIATE START

WE REQUIRE CALIBRE PROGRAMMERS WITH PROVEN EXPERTISE AND INTEGRITY FOR

BURROUGHS	6700	COBOL
ICL	1900	PLAN
ICL	1900	COBOL/DRIVER
ICL	System 4	COBOL/USERCODE
ICL	2900	COBOL
IBM	System 3	RPG II
IBM	370	OS/PL1
IBM	370	OS/COBOL/CICS
IBM	370	IMS/DB/DC

CONTRACTS THROUGHOUT THE U.K.

Apply to:
Trident Computer Services Limited
Sentry House, 110 Frimley Road
Camberley, Surrey
Telephone: Camberley (0276) 64252

Licensed annually by the Department of Employment as an Employment Agency and Employment Business

Morganite Ceramic Fibres Limited...

....market leader in the field of high temperature insulation and manufacturer of Triton Kaowool Ceramic Fibre is expanding its activities in the Wirral area.

The company requires a:–
SENIOR SYSTEMS ANALYST to control new computer hardware and systems shortly to be installed.

Applicants of either sex should have experience of programming plus the design and implementation of on-line systems. It is unlikely that anyone under the age of 28 will have the required experience.

A good salary will be paid for the right person, plus relocation expenses to this rural area close to Chester and the North Wales coast.

Apply with C.V. to:–
D.B.A. COMPUTER SERVICES LTD.,
21, MORLEY ST. LONDON SE1.
Telephone: 01-928 4582.

TRITON Kaowool ceramic fibre
Morgan

KING'S COLLEGE
UNIVERSITY OF LONDON COMPUTER UNIT

A SYSTEMS PROGRAMMER

is required to complete a small team of programmers developing software for a dual CDC 1700 system connected to the London University CDC 6600/7600 computer complex and providing a central service for both teaching and research throughout the College. The successful candidate will be a graduate prepared to take a keen interest in the continuing maintenance and development of the operating system, which includes a sophisticated interactive file handling and job submission facility. In suitable circumstances the opportunity to register for a higher degree is available.

The appointment is equivalent to an academic one, with salary on the programmer II scale within the range £2927 to £4199 + £450 London Allowance, depending on age and experience. Contribution to the Universities Superannuation Scheme (USS) is compulsory.

Further particulars from: Mrs. Eldridge, Computer Unit, King's College, Strand, London WC2R 2LS.

datascene

COMPUTER SERVICES MANAGER
Guaranteed 1st year earnings:
£9,000 + Profit share

Primarily, this is a job for a real business go-getter. Someone who can consolidate existing business, increase volume and turnover, and seek out new clients.

In a new position created by the expansion of a computer services company based in the West End of London, you will also be responsible for the recruitment of consultancy staff capable of providing services of the highest calibre.

You should already be successful at providing services to the computer industry, working in a sales-oriented environment, used to working within budgets, and capable of writing proposals. Obviously you must be ambitious.

The rewards are high. Remuneration is by way of an excellent basic salary, incentive bonus plus profit sharing, and, of course, job satisfaction.

Find out more by telephoning Martin Grayson or Mike Dauncey

FOR FURTHER DETAILS CONTACT

01-439 7871
24-hour answering service

Datascene Limited
Sceptre House
169-173 Regent Street
London W1R 7FB

Can you make computers jump through hoops?

Perhaps not — but are you the sort of person who has the flair and programming experience to solve technical problems? If so you may be the person we require to assist in the researching and testing of new software.

Knowledge of ICL *PLAN* and *COBOL* is vital. *Working* with a minimum of supervision, you will be involved with GEORGE 2+, Redifon-Seacheck and ICL Data view, so experience in any of these would be an advantage.

Salary: S01 £5,044-£5,350 p.a. inc.

Generous relocation expenses will be paid in approved cases.

Further details and application forms from Personnel Officer, Town Hall, Forest Road, Walthamstow, E.17 (Tel: 01-531 8899 — 24-hour answering service).

Closing date: 5th September, 1977. Please quote Ref: 8.508.

London Borough of
Waltham Forest

BRITISH GAS
Share in the future of Britain's Gas

ASSISTANT COMPUTER OPERATORS
CROYDON

Salary not less than £2877 per annum + 17% Rotating Shift Allowance. Five-day week.

SEGAS have vacancies for computer operating staff with 1 to 2 years' experience of IBM 360/370 hardware running under OS and/or VS operating systems.

Our present installation comprises a 1.5 mb 370/145 and a 0.5 mb Honeywell H4200 operating on a 3 x 8 hour shift/5-day week basis. A 2mb 370/148 is due for installation in October/November of this year. We undertake a wide variety of both batch and on-line applications and currently have about 150 remote VDUs installed throughout the Region. IBM software in use includes OS/VS1, VM/370, CMS, VTAM/NCP, CICS and ATMS.

- ★ Good working conditions
- ★ Generous holidays (this year's arrangements honoured)
- ★ Sick pay, pension and insurance schemes
- ★ Sports and *social* facilities

Write giving full details, within 7 days, and quoting ref. F3496 to: Personnel Manager, Segas, Segas House, Katharine Street, Croydon CR9 1JU.

SEGAS

COUNTY TREASURER'S DEPARTMENT
Computer Services Division

SENIOR SYSTEMS PROGRAMMER

Post Ref. T278
Grade S01/2 (4238-£4882 plus £520 supplement)

The post leads a team of three systems programmers responsible to the Operations Manager. He/She will have a minimum of five years' experience of the ICL George III Operating System, together with communications equipment and Datadrive. A technical background in a large machine environment is essential

Responsibilities will include operating system support, maintaining communications support plus Datadrive experience, together with involvement with the Systems/Programming Development Teams

Software Programmers

Salary £3388-£4085 (plus supplements Post Refs. T278/T277, totalling £520)

Applications are invited from suitably experienced persons who must have a sound knowledge of the operating system and other standard ICL issued software. The successful applicants will make up a team of specialists, led by a senior software programmer, who are responsible for all system software including communications manager and datadrive

Programmers

Salary £1,215-£4,545 (plus supplements of up to £520). Post Refs. T287-T270

These posts are career grade appointments: the starting salary point and progression through the grade will be based on experience and qualifications and will offer, for the right people, a flexible career development path and the opportunity at a later date to acquire some experience in systems analysis.

FOUR vacancies exist and applications are invited from competent programmers with a minimum of two years' experience of COBOL. Knowledge of ICL software and George 3 operating procedures is desirable and experience of NCC FILETAB would be an advantage

The County Council, with offices in Barnsley has a 192K ICL 1904S computer running under George 3 operating systems with extensive MOP and communications facilities.

Applications range from conventional batch systems to those involving integrated database techniques and emphasis, wherever practical in the future, will be on terminal based systems.

The hardware comprises of high speed drum 9X EDS 60, 7903, 7502 with VDU equipment, RJE via 7503/Ventek terminals.

Please telephone or write for application form (quoting the appropriate post reference) to the Chief Executive, South Yorkshire County Council, County Hall, Barnsley S70 2TN. Tel. Barnsley 86141, Ext. 288.

Closing date will be September 1st, 1977

South Yorkshire County Council
ENERGY IN ACTION

datascene

ANALYSTS/PROGRAMMERS
WEST END & CITY
£4000 to £7000

A large international Oil Company, with an expanding online IBM 370/148 system, urgently require several Programmers and Analyst/Programmers

You'll be working in a stimulating environment where personality matters almost as much as ability

Mind you, ability is important. You'll need at least 18 months' COBOL or PL1 programming experience, with either an IBM or ICL background. Data Base experience would be handy, but is not essential.

You'll enjoy a range of 'big company' benefits. Career prospects are excellent, and salary is not a limiting factor for the right people

FOR FURTHER DETAILS CONTACT US NOW

01-439 7871
24 hour answering service

Datascene Limited
Sceptre House
169-173 Regent Street, London W1R 7FB

datascene

Shift Leaders /Operators Junior Operators
ALL OPERATORS

Junior and Senior Operators with experience on IBM, UNIVAC, HONEYWELL, BURROUGHS, NCR, ICL, CDC & PDP required urgently. Listed below are a selection of our vacancies. If we don't see one to suit you, don't worry. Give us a ring and see what else we've got

IBM	DOS	1 yr.	C. London	[illegible]
IBM	DOS	2 yr.	S. London	[illegible]
IBM	DOS	1 yr.	S. London	[illegible]
IBM	DOS	1 yr.	W. London	[illegible]
IBM	DOS	1 yr.	Essex	[illegible]
IBM	DOS	1 yr.	City	[illegible]
ICL	G II	1 yr.	Essex	[illegible]
ICL	G II	1½ yr.	City	[illegible]
ICL	G III	1 yr.	Surrey	[illegible]
BURROUGHS	MCPV	2 yr.	City	[illegible]
BURROUGHS	MCP	6 months	C. London	[illegible]
UNIVAC	OS4	2 yr.	W. London	[illegible]
UNIVAC	ANY	1 yr.	W. London	[illegible]
PDP	ANY	6 months+	C. London	[illegible]
DEC	ANY	6 months	C. London	[illegible]
HONEYWELL	OS2000	1 yrs.	C. London	[illegible]

FOR FURTHER DETAILS CONTACT US NOW

01-439 7871
24-hour answering service

Datascene Limited
Sceptre House
169-173 Regent Street, London W1R 7FB

LEEDS

ANALYST/PROGRAMMER
Up to £4,200

Elida Gibbs Ltd., the Unilever toiletries subsidiary, is currently installing a computer system within a new, fully automated £7m distribution warehouse, which will be controlled by two large DEC PDP 11/70 computers programmed in both CORAL 66 and COBOL

The system controls two giant order picking machines, a driverless train used for the transfer of incoming goods (with its own dedicated PDP 11/04), 20 VDU's throughout the warehouse (including 4 MIMIC colour displays) and a certain amount of batch processing.

The Analyst Programmer will work in the team which is developing and implementing this system, followed by goods receiving, materials control and factory data capture applications based on new multiple PDP 11 mini computers running as part of a network.

On behalf of our clients, we are looking for an ambitious programmer with:

- *upwards of 1½ years' practical experience ON ANY MACHINE in a commercial environment*
- *a good educational background and a high degree of self-motivation*
- *the aptitude to develop into systems analysis in due course.*

Assistance with relocation expenses will be provided where applicable. Initial interviews will be held in Leeds or London, whichever is the more convenient for you.

If this excellent career opening appeals to you, please ring us, quoting ref. 918. Alternatively write briefly or leave a message with our answering service after hours.

Tel: 01-637 5796

EDP Systems
52-53 Margaret Street
London W1N 7FF

CITY up to £6,500
COBOL PROGRAMMERS/ANALYSTS

Computer Express is an established consultancy, providing professional service to a variety of clients. We are looking for programmers and analysts with at least two years' experience. We offer a challenging environment with good future prospects.

Telephone or write to The Technical Director, Computer Express (Services) Ltd., 69 Carter Lane, London, EC4. Tel. 248 5218.

A Career in Computers in the North West & Midlands

PROGRAMMERS & ANALYST PROGRAMMERS to £5500 + expenses

GENERAL MANAGEMENT
SENIOR PROGRAMMER/ANALYST
SENIOR ANALYST
CONSULTANT
S&P PROJECT MANAGER
ANALYST
SENIOR PROGRAMMER
ANALYST/PROGRAMMER
LEADING PROGRAMMER
PROGRAMMER
TRAINEE ANALYST/PROGRAMMER

The Fraser Williams Group represents an exceptional opportunity to join and progress in the software industry

We are a well established company with an impressive record of growth. Our turnover has increased by 50% in the last year, and it is planned to continue expanding at this rate.

We therefore need good quality people to help with this expansion. It is group policy to promote from within the company wherever possible and excellent opportunities exist for promotion to senior positions. The work is varied, assignments cover a wide range of main frame and mini-computer equipment both in the U.K., and overseas.

As well as an attractive salary we operate a profit sharing scheme which is paid half yearly and is based on an individuals own ability. We offer mileage expenses which make a significant contribution to the cost of running a private car.

If you are confident you are the kind of person we require contact your nearest Fraser Williams office now!

Manchester
J.E. Kinder, Fraser Williams, (Manchester) Ltd., Warwickgate House, Warwick Road, Manchester M16 0QQ. Tel: 061-872 8428.

Liverpool
J. Elliott, Fraser Williams & Co. Ltd., 61-63 Dale Street, Liverpool L2 2HJ. Tel: 051-227 3371.

Birmingham
A. Dowman, Fraser Williams (Midlands) Ltd. 10/11 Greenfield Crescent, Edgbaston, Birmingham B15 3AU. Tel: 021-455 8736

Offices also in London Tel: 01-388 0036 and Sheffield Tel: 0742 28638

Fraser Williams
computer consultants

Project Management
NORTH WEST

Our client is a major international company with headquarters in the North West of England.

Due to extensive reorganisation of the systems department the following opportunities have occurred in Project Management to further develop manufacturing and engineering Systems.

Project Supervisor

To investigate problems in the manufacturing and engineering areas and define and communicate precise 'user' needs for specific projects to technical colleagues. Also to implement and explain new and revised Systems to ensure user satisfaction.

Project Leader

To plan and control the development of computer based solutions to manufacturing problems and control Systems through from design to testing and implementation. Liaison with user departments is also involved, including demonstrations of Systems capabilities.

The company has a well established computer installation and is committed to further development of existing Systems making use of up to date techniques, mini computers, data base, telecommunications and distributed processing.

The successful candidates with proven experience in the above areas will receive a good salary, generous holiday entitlement, relocation assistance (if applicable) contributory pension scheme and participation in the company's car scheme.

Please write in confidence giving details of your experience and qualifications stating the names of any organisations to whom your letter may not be sent, to: R. D. Taylor.

Whites

Whites Recruitment Limited, 35 Dale Street, Manchester M1 2HF. Offices, Associates: Amsterdam, Bristol, Brussels, Dusseldorf, Leeds, London and Wolverhampton.

SOFTWARE DEVELOPMENT

SDI is expanding its software development capability and new employment opportunities are consequently available. It is the leading supplier of packaged Systems Software, being responsible for such packages as GRASP, GRASPVS, EPAT and FLEET, and operates in many countries having more than 200 employees.

You will be located initially in London and after successful completion of a three month probation period will be transferred to SDI's Research and Development centre in Hamilton, Bermuda. Bermudian applicants are especially welcome.

SDI owns and operates a large IBM 370/135 computer in Hamilton. There are VDUs and a TP link to the U.S.A. The entire computer installation is dedicated to software development, so the facilities and turnround are of the very best.

Vacancies exist within SDI for Senior Software Developers and Software Developers. This is an opportunity to participate in the development of Systems Software packages with the industry's leading specialist company in this field.

The required qualifications are:–
- * First-rate assembly-language programming ability;
- * Familiarity with IBM DOS or DOS/VS internals;
- * Willingness to work hard;
- * For Software Developers, a minimum of 2 years recent IBM DOS or DOS/VS experience;
- * For Senior Software Developers a minimum of 5 years recent IBM DOS or DOS/VS experience, and preferably experience of supervising others.

Bermuda is a conservative British Colony in the mid-Atlantic, less than two hours from New York. It has a pleasant climate and stable government. Salaries are paid in US dollars and there is no income tax. SDI will assist in obtaining work permits for successful applicants (who must have a maximum of two dependent children). A relocation allowance will be paid.

Applicants for these positions should submit an example (about 200-300 lines) of their IBM DOS (/VS) coding, together with a completed application form.

An application form, or more information about SDI or about Bermuda may be obtained by telephoning Marion Lustig at SDI London, (01) 731 4313. If you wish to apply for one of these positions you must do so in writing to:

Personnel Manager,
SDI, Reference BDA/SD,
184 New Kings Road, London SW6 4NF.

SDI

OPPORTUNITY FOR SYSTEMS PROGRAMMING!

WEST LONDON £5,000+

A Honeywell user in West London, wish to recruit good applications programmer to take on and train in systems programming. It would be of interest to someone with 2-3 years Cobol experience and sound knowledge of GCOS. This is an excellent opportunity for a programmer to make a definite career-step forward.

CHIEF PROGRAMMER

MIDDX. to £6,500

If you are looking for involvement in on-line programming development, as chief programmer, a large U.K. manufacturers would be interested in you. The successful applicant would be required to lead a team of 5-8 application programmers, he would have COBOL or RPG II languages and project control experience as well. Teleprocessing also helps. Excellent career opportunities plus relocation assistance are offered.

COBOL PROGRAMMERS

BUCKS./MIDDX. £4,500+

Two Cobol programmers are required with ideally eighteen months plus experience and familiar with ISM OS, to work for an international manufacturing and marketing company. Usual excellent benefits associated with a large company include relocation assistance.

SENIOR ANALYST/PROGRAMMER

MIDDX. c £5-£6,000

A leading industrial company in Middlesex are offering an excellent salary and conditions of employment to a senior analyst/programmer capable of dealing with the technique of IMS' Database, therefore a strong technical bias helps. Applications are on-line, real-time oriented. Cobol could be ideal but not essential.

SYSTEMS ANALYSTS

HERTS. to £6,000

Development career progression, financial or simply fed up with commuting. These are few of the reasons why you may want to consider working in a more local environment. At the moment we have at least a dozen requirements throughout Hertfordshire for SYSTEMS ANALYSTS with about 2 YEARS' good commercial or financial experience. Our client list is extremely reputable involving new installations and those already committed to expansion. We feel sure we must have a vacancy to suit your needs.

PROGRAMMERS

ESSEX to £4,500

One of the South East's most progressive ISM installations is currently embarking on a variety of new and interesting development projects. To help achieve their aims, they are seeking to recruit additional career-minded programmers with upwards of 1 year's ASSEMBLER experience. Although Assembler is a preference, those with a good COBOL background and a desire to learn another programming language should also apply. Benefits are excellent including a generous re-location package where appropriate.

SENIOR SYSTEMS ANALYSTS

CITY to £6,500 + BENEFITS

A leading city installation are currently expanding their data processing department to cope with the development of a wide range of major new systems. These projects cover a variety of commercial, financial and business applications. Candidates should therefore possess expertise in one of these areas together with supervisory qualities and the professional attitudes attributed to a senior appointment. Career progression is first-class and the benefits are all you would expect from a company of this stature.

FORTRAN PROGRAMMERS

NORTH LONDON to £5,500

Outstanding opportunities have arisen for experienced FORTRAN programmers to move into one of the most advanced Honeywell installations in the country. Our clients are particularly interested in those candidates wishing to develop in a Technical Support/Software area. Some knowledge of COBOL would be an added advantage. The company would also expect applicants to be interested in developing teleprocessing/communications systems.

SYSTEMS ANALYST

c £5,000 + MORTGAGE

ASSEMBLER PROGRAMMER

KENT—SOUTH COAST to £5,000 + MORTGAGE

A major financial company with pleasant offices close to the seafront wish to recruit a Systems Analyst with at least two years' financial or insurance experience to be involved with new systems development.
There is a further requirement for a programmer with good assembler experience preferably gained in an OS environment.
Start salaries will be competitive plus first class benefits including subsidised mortgage and full relocation expenses.

COBOL PROGRAMMER

CROYDON to £4,900

A household name, convenient to mainline railway station in Croydon have a large 2nd generation mainframe. They currently require several Cobol programmers with upwards of 18 months' experience gained on any mainframe. Benefits are good and an excellent feature of the company is the friendly working environment.

ANALYSTS

SURREY to £7,000

The high demand encountered in July for Systems Analysts in Surrey, has continued this month. At the time of going to press, we have 19 companies based in Surrey all wishing to recruit Analysts and Senior Systems Analysts. The companies range from finepiel, through retail to manufacturing interests and consequently it does not matter in which area your experience has been — we must have a vacancy that can interest you!

ASSEMBLER or PL/1 PROGRAMMER

RURAL SURREY to £4,500 + mortgage

One of the UK's largest financial organisations require 3 programmers with ASSEMBLER or PL/1 experience, to work on a number of varied applications. The company is situated in a pleasant rural location, close to mainline rail services. Benefits include cheap mortgage, flexitime and a non-cont pension scheme.

THESE ARE JUST A SMALL SELECTION OF OUR CURRENT VACANCIES, CONTACT US TO DISCUSS, WITHOUT OBLIGATION, ANY OF THE ABOVE . . .

OR CHECK WITH US TO SEE IF WE HAVE MORE SUITABLE VACANCIES IN THE LOCALITY YOU WISH TO WORK.

D.P. RECRUITMENT LIMITED

Kent House, 87 Regent Street, London W1R 7HF

Tel: 01-437 2062/3/4 (24-HOUR ANSAPHONE)

Computing Services Association

PROJECT MANAGER— PRODUCT SALES TRAINING

To £7,500 per annum

Exciting Career Opportunity to join a Major Computer Menufecturer as MANAGER of Product Sales Training Projects. This is a SENIOR POSITION reporting to the Worldwide Sales Training Manager.

You should have the ability to: laern quickly/communicate idees and concepts/trenslate product fecilities into seles benefits/enthuse others. Some treining experience is preferable, but not essentiel, and it would be en edvantage if you hed successful sales experience.

You will be working, in e STATE-OF-THE-ART environment, with Merket Development end Product Development Managers on latest computer techniques. This position will give you a CAREERS PATH into Marketing, Seles, Technicel Support or promotion within Worldwide Education/Training Group. In the course of your duties you will be required to TRAVEL in the U.K. and OVERSEAS.

The Compeny offer an EXCELLENT SALARY, EXPENSES, LARGE COMPANY BENEFITS end PROMOTION OPPORTUNITIES.

Telephone or write to the Senior Consultant quoting Reference No. CW 147.

Insight Marketing & Personnel Consultants Ltd.
72-75 Merylebone High Street London W1M 4AJ Telephone: 01-486 5644

PROJECT CONSULTANTS— SYSTEMS

circa £6,000 negotiable

A major menufacturer is embarking upon a sophisticated research programme into the viability of future, co-ordinated, edvanced systems for a MAJOR Public organisation.
This is en exciting and stimulating project which will appeal to Business and Systems Analysts with a creative approach to the medium and long term needs of major organisations.
Candidates must have et least five years' experience which should include large mainframe systems supporting **on-line** terminals. Although not essentiel, data base experience would be en added advantage.

This is a unique and challenging opportunity which will offer an exciting and progressive career. For confidentiel, initial discussion, please telephone the advising consultant quoting Ref. No. CW 146.

Insight Marketing & Personnel Consultants Ltd.
72-75 Marylebone High Street
London W1M 4AJ
Telephone: 01-486 5644

MIDLANDS—£12,000 +

SALES MANAGERS & SENIOR SALES EXECUTIVES

Do you have e proven record of seles success in the commercial market?
Have you seles experience of computer systems, services or bureau?
Are you seeking the opportunity to grow your career end be one of the highest paid members of the industry?
A generous salary, cer allowence and above averege commission backed by full technicel support, demonstration facilities and established user base will enable you to grow your career on the back of your success.
Ring immedietely the advising consultant quoting Ref. No. CW 145.

Insight Marketing & Personnel Consultants Ltd.
72-75 Marylebone High Street
London W1M 4AJ
Telephone: 01-486 5644

Develop with us.

Data 100 Systems Limited is a leading supplier of Multifunction Terminal Systems. Our continued expansion coupled with the introduction of a new range of products has created vacancies for Systems Engineers (Software) and Customer Engineers with the drive and enthusiasm to assist the development of our successfully established Support Organisation.

SYSTEMS ENGINEERS

These positions offer excellent opportunities to move into product specialisation or management positions with the Software Services Group for personnel with experience in some of the following areas:-

Applications Programming
Software Development
Communications
Small Business Machines
Interactive Systems
Key-to-Disk Applications

These positions will be based at the Company's Head Office in Hertfordshire.

CUSTOMER ENGINEERS

Suitable applicants will be experienced in the field maintenance of computer and their associated peripheral equipment. These positions offer excellent career prospects leading to management control of customer support areas.

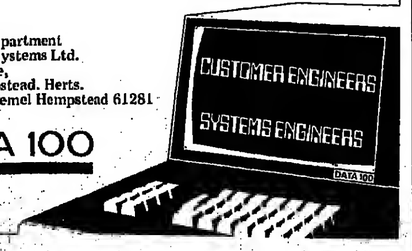
Current vacancies exist in the following locations:-

London Central, Manchester, Birmingham, Sheffield

The Company offers competitive salaries which are negotiable and commensurate with experience. A Company car is provided together with fringe benefits, including relocation assistance, where necessary.

If you feel you have the experience that would contribute to our success, please apply to Mr. T. Hubber at the address below.

Personnel Department
DATA 100 Systems Ltd.
Maxted Close,
Hemel Hempstead. Herts.
Telephone Hemel Hempstead 61281



DATA 100

PLYMOUTH POLYTECHNIC

COMPUTER CENTRE

PROGRAMMER

Salary: £2,922-£4,068 (+£312 p.a. supplement)

To contribute to student service work, developments on MAXIMOP, and the writing of programs for a wide range of scientific and administrative systems for both 2903 and 1903A.

Good working knowledge of FORTRAN/COBOL and experience with GEORGE 2 and/or MAXIMOP would be advantageous.

Application forms, to be returned by 2nd September, 1977, can be obtained with further particulars from the Personnel Officer.

PLYMOUTH POLYTECHNIC, DRAKE CIRCUS, PLYMOUTH PL4 8AA

Leeds POLYTECHNIC

School of Mathematics and Computing

LECTURER II IN COMPUTER STUDIES

Applicants should have a good degree in a relevant discipline and experience in the design of scientific/engineering or commercial data processing systems.

Teaching experience will be an advantage but training on an in-service basis can be given if necessary.

Salary Scale. £3744-£5985 (including supplements).

Re-advertisement — previous applicants will be considered without further submission.

Details from.
The Services Officer (C.24)
Leeds Polytechnic
Calverley Street
Leeds LS1 3HE
0532 41101

Please enclose s.e.a.

Closing date: 2 September 1977

The Civil Aviation Authority is responsible for the regulation of civil aviation in the United Kingdom and the provision of Air Traffic Control and associated services for all air traffic into, out of and over U.K. airspace.

The Authority is to expand its Computer Services Branch in London, which is responsible for the development and maintenance of administrative, commercial, technical and scientific computing systems. This expansion includes the replacement, in the latter quarter of 1977, of an ICL 1903T by a 2 megabyte ICL 2960 with EDS 100/200's, CNP, terminals etc.

Systems Analysts to £6,000

A number of Systems Analysts or Systems Designers are required to be responsible to a Senior Systems Analyst or Project Leader for systems analysis, programming and implementation, and for the work of Trainee Systems Analysts and Programmers assigned to them. On larger projects it may be necessary to carry out the functions of a Senior Programmer in writing the main programmes in a system.

Applications are invited from candidates with:

- ☐ A degree or professional equivalent or good 'A' levels.
- ☐ Two years' experience of systems analysis, including successful implementation of projects, and/or
- ☐ Three years' experience of programming, in COBOL, at a senior level.

It would be an advantage to be familiar with ICL 1900/2900 series.

Salaries will be negotiated within a scale from £5,171 – £6,023, according to qualifications and experience.

Programmers to £4,900

A number of programmers are required to be responsible to a Project Leader or Systems Analyst for the efficient and accurate production of computer programmes to specification for the Authority's ICL 1903T and for the replacement ICL 2960.

Applications are invited from candidates with:

- ☐ Good academic or professional qualifications
- ☐ Two years' experience in PLAN/COBOL or FORTRAN on an ICL 1900 series.

Experience of ICL 2900, systems analysis, databases etc. would be an advantage.

Salaries will be negotiated within a scale from £2,957 – £4,926, according to age, qualifications and experience.

For an application form please write or telephone:
A Bennett, Civil Aviation Authority,
Personnel Branch 2, Aviation House,
129 Kingsway, London WC2B 6NN.
Tel: 01-405 6922 Ext 599.
Applications must be returned not later than 5 September 1977.

CAA

TRIED ANY NEW POSITIONS LATELY?

OTHELLO — an addiction from Computer Weekly — see page 17.

IBM 370/135 HARDWARE ENGINEER

SDI BERMUDA require an experienced engineer with 370/135 training to become the company's Hardware Specialist.
Applicants should have extensive field experience in the maintenance of IBM 360 and 370 peripherals, and preferably would have had some supervisory experience.
Bermudian applicants are especially welcome.
SDI, the creators of such software packages as GRASP, GRASPVS, FLEET, and EPAT invite the successful applicant to maintain and advise on the company's hardware requirements for its Research and Development Centre in Hamilton, Bermuda.
Bermuda is a conservative British colony in the mid-Atlantic, less than two hours from New York. It has pleasant climate and stable government. Salaries are paid in US dollars and there is no income tax. SDI will assist in obtaining work permits for the successful applicant (who must have a maximum of two dependent children). A relocation allowance will be paid.
If you require an application form, or more information about SDI or about Bermuda, please telephone Marion Lustig at SDI London (01) 731 4313. If you wish to apply for this position you must do so in writing to:

Personnel Manager, Reference BDA/HS,
SDI, 184 New Kings Road, London SW6 4NF.

SDI

RPG ANALYSTS AND PROGRAMMERS

£5000+ **BIRMINGHAM**

We are retained to find a small number of RPG2 analysts and programmers for the consultancy arm of a large international company. We are looking for the following background:

- ★ RPG2 experience on any hardware. COBOL would be useful.
- ★ Ability to work to realistic schedules and high standards.
- ★ Wish to move into systems work and project management.

Our client's offer the following:

- ★ Excellent salary and benefits of a large company.
- ★ You will be able to make a real contribution to a small team.
- ★ Progression will be rapid, based on performance.
- ★ New software and hardware developments.
- ★ Relocation expenses will be paid where necessary.

For a confidential discussion, contact Mike Hessian, quoting reference CW19.

CPC

021-632 6848 (24 hr.)
COMPUTER PERSONNEL CONSULTANTS
ROTUNDA, NEW ST., BIRMINGHAM

RECRUITMENT CONSULTANTS
LONDON – MANCHESTER – BIRMINGHAM
INCOMES – c6-10K

SCR — Specialist Computer Recruitment Ltd. is in the forefront of the recruitment of Data Processing Professionals in the UK. It's established offices now have additional opportunities through a policy of continued expansion and growth of this and it's associated computer services companies.

Specifically:

for LONDON

Experienced D.P. recruitment persons interested in moving into a more professional, rewarding and stimulating working environment.

for BIRMINGHAM and MANCHESTER

persons should have:

* Ideally an understanding of recruitment
* developed sales attitudes and genuine sales experience
* a knowledge of the data processing industry

and be:

* "self-starters" with a preparedness to work under pressure

Each of these positions offer, by industry standards, the opportunity to earn exceptionally high earnings in a stimulating atmosphere. These earnings, it should be appreciated, are directly related to results.

If you think this could be you:
CONTACT: PETER RIGBY on 021-236 3781

REF: 77/08/17

SPECIALIST COMPUTER RECRUITMENT LTD.

BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

MANCHESTER 061-833 0676 FREEPOST
Freepost, Corn Exchange Buildings, Corporation Street, Manchester M4 8BD

LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London W1E 1JZ

Computing Services Association

SCR

EXECUTIVE — CONSULTANT — MANAGER

MAJOR INTERNATIONAL RESPONSIBILITY

Managing 25 Professional Staff plus Budget for Expansion

Basic Salary — £7,000-£8,000 — Total Compensation potential from profit participation circa £12,000

One of Europe's largest and most successful Software Consultancy Houses requires a manager to extend their capabilities and International market share.

Based in the U.K. he will be managing 25+ professional staff operating in all advanced areas of the Computer Market, including consultancy and implementation.

Areas of responsibility include Technical Management, Resource, Organisation, Marketing, Contract Control and most important of all, achievement of profit objectives.

Candidates will have a degree or professional qualification, management capability, extensive computer experience and will probably have held a significant position in a professional Software and Consultancy House environment.

In addition to this experience we will be looking for the following characteristics: NUMERACY, CREATIVITY, STRATEGIC MARKETING ABILITY, LEADERSHIP, and a strong ENTREPRENEURAL FLAIR.

DP SC

Crown House, Morden, London SM4 5EU
recruitment division
01-540 8311
24 hour answering service

WE URGENTLY NEED ANALYSTS, PROGRAMMERS AND OPERATORS FOR CLIENTS THROUGHOUT THE UK

Demand for experienced personnel maintains a very high level. We would like to hear from you if you are currently considering a new job. Briefly detailed below are a selection of clients' requirements.

PROGRAMMERS

London

SW1	IBM OS COBOL 3 yrs.+ to £5,000 p.a.
City	6 MOS+ ICL COBOL to £3,000 p.a.
City	IBM DOS or OS COBOL to £5,000 p.a.
W1	2 yrs+ OS COBOL to £5,500 p.a.
W1	3 yrs.+ DOS/VS Ass. to £5,300 p.a.
City	2 yrs. Ass. or PL1 to £4500.
West London	3 yrs+ 1900 COBOL to £5,000 p.a.
West End	1 yr. pref. IBM COBOL £3,000+.

Home Counties

Sussex	2 yrs.+ OS COBOL to £4,500.
Sussex	3 yrs.+ OS COBOL to £5,000.
Bucks.	3 yrs.+ IBM COBOL to £5,500.
Herts.	18 mos.+ any COBOL to £5,500.
Herts.	2 yrs.+ 1900 COBOL to £4,800.
Essex	2 yrs. any Ass. or PL1 to £5,000.
Middx.	18 mos. 1900 COBOL to £4,000.

Other Areas

Works.	2 yrs. FORTRAN to £4,000
Works.	2 yrs.+ Hon COBOL to £4,500.
Worcs.	2 yrs. 1900 COBOL to £4,000.
Durham	2 yrs. any COBOL to £4,500.
Midlands.	IBM COBOL to £5,000.
Manchester	1 yr.+ PL1 or PLAN TO £4,500.
Liverpool	1 yr.+ PL1 or PLAN to £4,500.
South Manchester	IBM Ass. COBOL and CICS to £5,000
Lancs.	RPG II any experience to £4,600.

ANALYSTS

We currently have urgent requirements for analysts with three years + commercial systems design at many locations throughout the UK. Salaries are in a range up to £5,500 plus various benefits.

OPERATORS

We are particularly interested in hearing from IBM or ICL operators with 12 to 18 months' experience for a variety of installations in London, Home Counties and the North of England.

CONTRACTS

We also have a number of requirements for Contract Programmers. If you are currently available or free within the next month or two, we would like to hear from you.

MARTON associates 206/210 Bishopsgate London EC2M 4NR
Phone Sara 01-283 3237

PRODUCT NOTES

Portable version of Informer VDU

FOLLOWING the introduction of the Informer range of VDUs into the UK last year, Cole Electronics is to make available a portable version.

Intended for mobile personnel in the data-capture market, it needs no special operating environment.

Available as a briefcase-sized unit with a recessed carrying handle, it features a hinged keyboard which flaps down to reveal the screen and controls, said the Croydon, Surrey firm.

Keyboard variants similar to those provided with the earlier Data-Entry models are offered, complete with function keys and numeric pad for high speed entry of data.

Character interactive transmission is facilitated by one model that is fitted with a full duplex/half duplex switch, but a polled block mode alternative may be selected.

Baud rates of 110, 150, 300, 600, 1,200, 2,400, 4,800 and 9,600 bits per second can be selected via a front panel switch on both units.

An acoustic coupler for direct connection to any telephone line can be incorporated — whether on locations at a remote site or in a hotel room.

This option is available for transmission at 110, 150, or 300 baud in half or full duplex modes; or at a rate of 1,200 baud in half duplex mode.

Cole added that other options available include direct connection to high speed modems via an RS232C interface to the computer system or hard-wired direct connection to the designated line.

The CCITT V24 interface is available if the VDU is required to drive a printer, offline storage facilities in the form of add-on cassette units or floppy disc drives; and a composite video output for driving large screen monitors.

The terminal weighs 23lb (10.5Kg) and it measures 5¼ x 13¼ x 20½ inches (13.5 x 34 x 52 centimetres). Its six-inch screen displays 512 characters — 16 lines of 32 characters each — which are visible at dual level intensities and it can be supplied for 50Hz operation.

Cole Electronics Ltd (CW), 33-35 Lower Coombe Street, Croydon, CR0 1AA. Tel: 01-688 6822.

UK launch for Styrofill loose-fill packing material

SPICER-COWAN is to manufacture under licence and distribute in the UK the Styrofill expanded polystyrene loose-fill packaging material developed by BASF in West Germany.

The saddle-shaped chips will be available in 15 cubic feet polythene sacks that can be adapted into hopper mode.

It added that Styrofill was chemically inert and resistant to most common materials and many corrosive chemicals; but would be attacked by some strong oxidising agents.

The chips are soluble in petrol, sulphuric acid, benzene, nitrile and paint thinners but are resistant to many proprietory greases.

Spicer-Cowan pointed out that since the cell walls of Styrofill — about 2% of the total volume — consisted of amorphous thermo-plastic, the material was not sensitive to low temperatures.

It did, however, become progressively softer at temperatures approaching 100°C.

Under the loads likely to be imposed during transport, the manufacturer advised that Styrofill could be used at temperatures of up to 85°C.

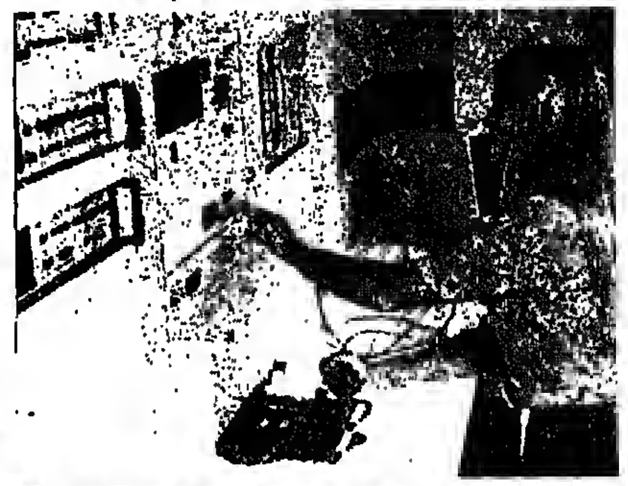
Spicer-Cowan claimed that the chips contained a stable, non-volatile bromine compound which acts as a flame-retardant and could not be ignited by the prolonged action of a strong flame when it was held in either polyethylene bags or piled loosely.

However, it was combustible when placed in contact with cellulosic materials such as wood, wool, paper or cardboard; but the rate of spread of flame was considerably less than other packing materials.

Styrofill will not swell, disintegrate, hydrolyse or rot when brought into contact with moisture and is not hygroscopic.

It can be recycled either as a cushioning material or shredded to lighten horticultural earth and for field drainage. It can be incinerated in a proper incinerator operating at 800 to 1,000°C with no harmful products released, Spicer-Cowan added.

Spicer-Cowan Ltd (CW), New Hythe Lane, Aylesford, Maidstone, ME20 7PB. Tel: 0622 77777.



From Membrain is an analogue testing software pack which is designed for guided probe fault isolation on analogue portions of the circuit.

Named Analyst, the Wimborne, Dorset firm said that in actual operation of testing hybrid and analogue modules, the system automatically applies the test program. If the board fails the test, the operator is instructed to probe back along the sensitised paths to isolate the functional block which is defective.

Membrain Ltd (CW), 23 Cobham Road, Ferndown Industrial Estate, Wimborne, BH21 7PE. Tel: Ferndown (0202) 893535.

Document conveyor

DESIGNED to hold computer print-outs and tapes as well as box files and paper sheets is the Type 45/35 vertical document handling system from Documotion, the newly-formed document handling division of Hytrec Conveyors.

The 45/35 uses the paternoster principle of a continuously circulating vertical conveyor that supports containers. It provides a delivery frequency of five containers a minute.

All moving parts are remote from routine operating areas, said the Sevenoaks, Kent firm and the chain circuit is driven by a worm-gear motor with a magnetic brake linked to the main chain wheel.

This whole assembly is housed in a sub-frame at the top of the shaft with a corresponding tension unit at the base of the shaft.

The document containers are injection-moulded polythene. The system can be installed in either high rise or low rise buildings.

Documotion Ltd (CW), Ridgelands House, Malt House Road, Stansted, Sevenoaks, Kent. Tel: Sevenoaks (0732) 822466.

Silencer

WHAT is claimed to be the most effective silencing system yet offered for the Centronics line printer, is now available from Commercial Acoustics.

Called the Peacemaker, this silencing cover reduces ambient noise levels by 80%. The use of transparent plastic on the cover has been kept to a minimum to avoid static build up and construction is of metal with acoustic foam lining.

The base is hinged to allow program loop changes and the access lid enables paper to be removed easily.

The cover can be installed in minutes and is available ex-stock direct from CAL or its agents.

Commercial Acoustics Ltd (CW), Cathles Road, Balham Hill, London SW12 8LD. Tel: 01-673 3333.

Matrix printer

A SILENT non-impact matrix printer, the MiniDip, which can print 80 columns at up to 30 chps has been introduced by Computer Engineering Ltd, of Hitchin, Herts.

The MiniDip comes with a 5 x 7 dot matrix print head and a standard CCITT V24 interface for transmission at 110/300 baud. It weighs 20lb and can be supplied in two versions, one with a standard ASCII keyboard and the other as a printer only.

Computer Engineering Ltd, Cadwell Lane, Hitchin, Herts. Tel: Hitchin (0462) 52731.

Announcing the release of its "quad" 8191 series magnetic tape controllers onto the European market is Datum (Electronics).

The Harlington, Middlesex firm said that the controller (pictured above) is intended for the user who requires a high degree of flexibility together with an intelligent front panel to show status of all drives connected to the system.

Front panel facilities include transport select which allows the logical address of a particular drive to be changed. Also HI/LO density switches are provided for each drive position which can be programmed at time of order for any of two densities from 200, 556, 800 and 1,600 bpi. Interfaces are available for most US-made minis.

Datum (Electronics) Ltd (CW), Cranford Lane, Harlington, Middlesex. Tel: 01-897 0456.

Communications adapter

FROM ATS is a communications adapter which, it is claimed, will overcome the problems of connections between two wire modem systems and a mainframe.

Designated the ATS 7826CA, the Haywards Heath, Sussex firm said that the device is priced at £280 per channel in stand-alone form.

The unit will allow 1,200×75 baud operation on a symmetrical 1,200×1,200 baud port or 600×75 baud on a 600×600 port.

ATS claimed that the 7826CA was designed as a cost-effective alternative to a small front-end communications computer and also that it enabled the use of full duplex over public switched telephone lines and two wire private lines.

ATS Communications Ltd (CW), 30 Bridge Road, Haywards Heath, Sussex. Tel: 0444 52377.

Desk top collator

DESK top collator for small offices, branches or company departments has been launched by Roneo Vickers' mailroom division.

Named the Neopost C8, Roneo Vickers said that it combines collating with jogging so that copies were ready for binding, punching or stapling.

The C8 includes an eight-station manually operated collator and an electric jogger. Documents are collated by a collector unit over each station and dropped into sets into the jogger. Each station of the collator has a capacity of up to 200 sheets and will accommodate both A5 and A4 paper sizes. Stations not required can be blanked off.

Roneo-Neopost Ltd (CW), 74 Upper Richmond Road, Putney, London, SW15. Tel: 01-874 0404.

From National Semiconductor is a combined watch and calculator that incorporates two new chips. The manufacturer claimed that it was the first on the market to use liquid crystal display technology.

In addition to presenting a six digit continuous display of hours, minutes and seconds the unit also has a month date calendar, an indicator and dual night viewing lights. In calculator mode, it employs algebraic and recall memory, pi, power of numbers, register exchange and reciprocals. The chips are mounted on a small printed circuit board on which is also mounted a miniature five by four matric keyboard and field effect liquid crystal display. The keyboard can be actuated by a pen, pencil or other small pointed instrument. Thirty-six possible switch functions are available on the dual function keyboard.

Normally in the numeric entry mode, a function key calls up the upper case functions such as natural logs and sine or cosine.

Of the two chips, MM58101 is the control ROM element portion and contains 16K in 32 pages of 64 eight bit instruction words each. The MM58102 is the memory and processor element chip. It contains 384 bits of complementary MOS random access memory organised as eight 12 digit registers. It is priced at about £185.

National Semiconductor UK Ltd (CW), 19 Goldington Road, Bedford, MK40 3 LF. Tel: 0234 211262.

Cleaner

AN air cleaner, known as the UFO, has been introduced by the Staines Group. Mounted in the ceiling, it has a sub-micron air filter which has been designed to remove from the air circulating in a room pollution down to a particle size of 0.5 microns.

In addition to removing impurities from the air, the UFO is also capable of nullifying a wide range of gases commonly used in industry, said the Southall, Middlesex firm.

It claimed that the UFO recirculates heated air from high levels of a room back to floor level and will keep the air clean without introducing chemicals or altering the basic structure of the air. The running cost is said to be less than that of a 100 watt light bulb.

Staines Group (Catering Equipment) Ltd (CW), International Trading Estate, Brent Road, Southall UB2 5LF. Tel: 01-574 2322.

Terminal for Arabic, Farsi

A TERMINAL that can accept and output Arabic and Farsi characters has been launched by the Intelligent Systems Corp of Georgia, USA.

Designed for use with the Intercolor 8001 alphanumeric and graphic eight-colour terminal, its main feature is that the shape of the letters change depending on their position in a word.

ISC said that this will allow the operator to enter data without regard to upper and lower case letters or to other forms of the character.

In addition, when numerals or English alphabetical characters are entered, they are automatically justified from the left.

ISC pointed out that the 8001 version of Basic is to be made compatible with the keyboard.

All terminals can be upgraded to programmable intelligent terminals or to microcomputers.

A 90-day delivery period is quoted and prices start at about $5,000 (£2,900).

Intelligent Systems Corp, 5,965 Peachtree Corners East, Norcross, Georgia, 30071, USA. Tel: (404) 448 5961.

Shredder

FROM Business Aids is a shredding machine, the Microplus, which will turn microfilm and fiche into micro chips in seconds.

Made in West Germany, the Park Royal, London firm said that the Microplus is portable and can be used to destroy out-of-date film, fiche, aperture cards, jackets, hard copy, carbon film and nylon typewriter ribbons.

Business Aids said that Microplus reduces fiche to 1,500 chips that are indecipherable at 48 times magnification. Costing £268 plus VAT and supplied in a cabinet that is 331 x 221 x 445 millimetres in size (13¼ x 8¾ x 17½ inches) and weighs 19.5 Kg (43lb). Deliveries are to start in August.

Business Aids Ltd (CW), 3 Whitby Avenue, Park Royal, London NW10 7SQ. Tel. 01-965 9821.

Converter

ANNOUNCING a paper tape/floppy disc conversion system is the Edgware, Middlesex firm of Pragma.

Known as Model 6021, the unit permits conversion of data held on paper tape onto floppy disc and vice versa. The tape can be in any of five, six, seven or eight track types and the floppy disc can be either IBM or non-IBM compatible format.

Pragma said that the paper tape reading speed is 120 chps, while punching is at 60 chps. Control switches permit the selection of specific tracks and/or sectors for conversion.

Pragma Ltd (CW), Middlesex House, 29 High Street, Edgware, HA8 7UU. Tel: 01-952 9471.

Multi-form printer

ANNOUNCING the introduction of a variable pressure 30 chps multi-form printer is GNT Automatic of Slough, Berks.

Named MFP, GNT said that it was based on the General Electric TermiNet 30 matrix printer. Designed for operator convenience, the MFP allows a selector to be used to pick the numbers of copies needed from a single copy to up to nine copies with settings in between.

The MFP is equipped with a new design of tear bar to ensure efficient handling of multi-part forms and it accepts paper stock ranging in thickness from 0.0025 inches (0.0635 mm) to 0.0280 inches (0.7110 mm).

GNT Automatic (UK) Ltd (CW), Windsor House, 1 Albert Street, Slough, SL1 2BH. Tel: Slough 21296.

Power unit

AN extensive range of low-cost power supply units offering a choice of voltage and current ratings is now available from Electronic Brokers.

The London, W1 firm said that general purpose units are available providing continuously variable, stabilised and protected dc supplies.

Examples include six to 14 volts at 2.5 amps (Model PG 76, priced at £22.50); 10 to 15 volts at 12 amps (Model PG 312 at £65.00); and four to 40 volts at two amps (Model HS 76/40, priced at £49.50).

Certain models feature switch-selectable constant voltage or current operation, floating output and automatic shut-down on persistent short-circuit.

The units, aimed at the requirements of production testing and bench use in experimental and educational establishments, are supplied purpose-built for particular applications.

Electronic Brokers Ltd (CW), 49-53 Pancras Road, London, NW1 2QB. Tel: 01-837 7781.

Daisy wheel printer

A DAISY wheel printer claimed to be the only one on the market with two rows of characters on the stems is now available from Ultronic Data Systems. Called the UDS-Ricoh RP-40 it can run at up to 40 chps.

The 96-character daisy wheel on the RP-40 is fitted with top-character slugs which slip over the plastic stems. The wheel is 20% smaller than other types and UDS said that this improves print quality, increases print speed and gives the wheel an increased life because of the lower hammer impact required. Line length is 136 characters at 10 pitch.

Ultronic Data Systems, UDS House, 3 Jefferson Way, Thame, Oxon OX9 3SU. Tel: Thame (084 421) 3151.

Engineering system

A COMPUTER system, designed expressly for process control, has been introduced by the Stevenage, Herts firm of Taylor Instruments.

Named Polstar, the system features Taylor's own high level language POL*3 which uses familiar process control terms to define operating procedures and an industrial control application package, ICAP.

The basic hardware compliment for the Polstar system includes a 32K word minicomputer with a real time clock, hardware multiply-divide, 64 priority-interrupt levels and automatic power failure/restart control keyboard printer terminal for system input or printouts, flexible disc memory and modular process interface. The mini can be upgraded to 64K words in size.

The system supports a full complement of peripherals that include dedicated line printers, paper tape and card handlers and monochrome or colour VDUs.

Taylor Instrument Company Ltd (CW), Gunnels Wood Road, Stevenage, SG1 2EL. Tel: 0438 2308.

Monitor

A TEMPERATURE and humidity monitoring instrument giving a permanent 24 hour day record has been introduced by Wright Air Conditioning of Birmingham.

Housed in a glass fronted wall cabinet, the monitor has adjustable high and low limit relays to give audible and visual alarms. The seven-day chart in the monitor can be changed in two or three minutes.

Wright Air Conditioning, Sampson Road North, Camp Hill, Birmingham, B11 1BL. Tel: 021-773 7241.

Modem

A LOW cost modem announced by Borer Electronics is designed to operate at any asynchronous speed up to 1,800 bps. Known as the Model 12/18, it is available in three versions that all incorporate comprehensive diagnostic facilities, and are Bell and CCITT compatible. Prices start from £150, with delivery in four weeks.

Borer Electronics Ltd (CW), Fishponds Road, Wokingham, Berkshire RG11 2QJ. Tel: 0734 793372.

Puzzle answer

LET us imagine that the distance traversed by the wire (10 x 4 = 40cm) is the base of a triangle, with cylinder length the height. Then the hypotenuse of such a right-angled triangle will obviously equal the actual length of the wire. Pythagoras . . . gives Length2 = 402 + 92 . . . so Length is in fact 41cm.